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SIMULATION GAMES AND CONTROL BELIEFS. FINAL REPORT.

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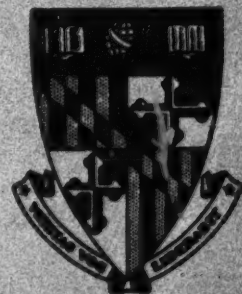
AN EXPERIMENT WAS CONDUCTED TO INVESTIGATE STUDENTS' SENSE OF CONTROL OVER THEIR OWN DESTINIES, THE EFFECTS OF SIMULATION GAMES ON THESE CONTROL BELIEFS, AND THE RELATIONSHIP OF THESE ISSUES TO THE RACIAL COMPOSITION OF A SCHOOL. IT WAS HYPOTHESIZED THAT INDIVIDUALS LACKING A SENSE OF CONTROL HAD HAD LIMITED EXPERIENCE WITH SITUATIONS WHICH COULD BE AFFECTED BY THEIR OWN ACTIONS, AND THAT SIMULATION GAMES WHICH PROVIDED THIS EXPERIENCE CAN GIVE STUDENTS THE SENSE OF SUCH CONTROL. THE EXPERIMENTAL SUBJECTS WERE MIDDLE-ABILITY STUDENTS IN THREE HIGH SCHOOLS, AN ALL-NEGRO, AN INTEGRATED, AND A PREDOMINANTLY WHITE ONE. IN EACH SCHOOL PAIRS OF CLASSES PARTICIPATED IN TWO SIMULATION GAMES INVOLVING MATERIALS ON (1) GOVERNMENT LEGISLATION AND (2) "LIFE CAREERS" DECISIONS. MATCHED CONTROL GROUP CLASSES COVERED THE SAME MATERIAL USING CONVENTIONAL READING MATERIAL AND CLASS DISCUSSIONS. QUESTIONNAIRES WERE ADMINISTERED TO STUDENTS BEFORE AND AFTER THE GAMES TO ASSESS THEIR CONTROL BELIEFS. DATA WERE ALSO GATHERED ON STUDENTS' BACKGROUND, RACE, AND SCHOOL RECORD. THE FINDINGS SUGGESTED THAT ALTHOUGH THE GAMES DO NOT PRODUCE FACTUAL LEARNING OR A SENSE OF CONTROL "OF A GLOBAL SORT," THEY DO SEEM TO AFFECT SUCH CONCEPTS AS PLANNING AHEAD, FUTURE, LEARNING, AND SELF. THE INTEGRATED NEGRO STUDENTS PERFORMED NO DIFFERENTLY FROM "THOSE IN THEIR RESPECTIVE GROUPS." THE FINDINGS OF THE STUDY WERE FELT TO BE GENERALLY INCONSISTENT AND TO INDICATE THAT CONTENT LEARNING AND CONTROL BELIEFS ARE RELATED TO A COMPLEX SET OF VARIABLES. (LB)

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THE JOHNS HOPKINS UNIVERSITY

THE CENTER FOR THE STUDY OF SOCIAL ORGANIZATION OF SCHOOLS

Final Report

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INTRODUCTION

The objective of this research was to combine an analysis of the concept of control of destiny with an analysis of the learning effects of games with simulated environments in order to gain an understanding of the ways in which this attitudinal variable and this learning technique may affect each other. The research had three specific objectives:

1. to analyze the meaning and effects of control beliefs;
2. to investigate the possible effects of exposure to simulation games on control beliefs;
3. to relate these issues to the context of de-facto segregated vs. non-segregated schools.

A growing body of theory and evidence supports the view that behavior in general and learning in particular is strongly affected by the individual's sense of "control of destiny" -- that is, the extent to which he believes that his destiny is controlled by himself rather than by luck or other arbitrary features of his environment (Rotter, 1966; Seeman, 1966). More recently, impressive evidence was presented by Coleman and Campbell in their large-scale survey of education in the United States (Coleman & Campbell, 1966). This survey was intended inter alia to discover, on a large national sample, the factors which make for high versus low achievement in school. Among the major findings were those pertaining to a variable defined as "belief in control of environment":

- that the extent of this belief was a major differentiating factor between white and Negro school children (at grades one, three, six, nine, and twelve);
- that this belief is the best predictor of school achievement for Negro children and the second best predictor for white children; this finding holds when other relevant variables, such as family background and characteristics of the school and faculty, are held constant;

-- that the zero-order correlation of this belief with achievement, is as high as the correlation of achievement with ability measures.

Thus much of the ineffective behavior associated with socio-cultural background may be rooted in a low sense of control rather than in the lack of abilities and drive implied by the term "cultural deprivation," and low sense of control may in turn hamper actual learning -- including the learning of control beliefs.

The antecedents of sense of control are not known, nor have effective ways to increase this sense been established. One possibility is that a low sense of control derives from insufficient experience with situations characterized by clear actual contingencies -- that is, from a past where outcomes in fact have not been highly contingent on the actor's own behavior or where the contingencies have been too complex for easy perception (on the importance of the nature of contingencies in childhood, see Gewirtz, 1961).

Our general hypothesis in this study is that simulation games may have a general impact upon this very important attitudinal variable, in addition to teaching whatever knowledge and skills are contained in a specific game. Our hypothesis is based upon the conception of deprivation, formulated in the previous paragraph, as a more or less accurate definition of the individual's actual real-life situation -- that is, that absence of sense of control is more likely among those who have in fact had less experience with situations where they either could control the outcomes or could at least see how their own actions were related to the outcomes. If this is an accurate conception of the variable (data relating to this point will be presented in the first section of the data analysis), extended experience in simulated environments might remedy the deficiency. Our hypothesis is also based upon empirical clues obtained from our field testing of simulation

games during the past five years (e.g., Boocock, 1963; Boocock and Coleman, 1966), although there is no systematic body of evidence that games can have a positive effect upon control beliefs.

In this paper, we shall be working toward formulation of a model which will describe the components of sense of control of destiny and the way it affects and is affected both by characteristics of the individual's background and environment and by experience in simulation games as compared with more conventional learning situations.

Research Design

Figure A shows the design of the experiment conducted in three Baltimore schools in March, 1967, including the sample used and the sequence of activities in the experimental and control classes.

As Figure A shows, the schools were selected to represent different racial composition. Within each school, our objective was to select pairs of classes:

- in social studies classes which were closest in content to the content of the games to be used as the experimental treatment (so that the activities in both experimental and control classes would seem as far as possible a natural part or extension of the course);
- taught by the same teacher (and by a teacher who had at least a minimum level of interest in the project);
- of the same ability level. In each school we asked for students of "average" or middle level ability for that school -- i.e., we did not want classes of the brightest youngsters in that school nor classes for slow learners or other problem students. Of course, this did not mean that the mean ability level was the same in the three different schools used.

All classes in Schools A and C were 11th grade American history (which includes a unit on Congress, and usually some kind of work on the labor market or occupational opportunities in America). At School B, because of scheduling problems, teaching loads, and very tight use of classroom space, we could get only one pair of 10th grade classes that met our other criteria. Since

FIGURE A. Research Design

	PRE-TEST (questionnaire)	EXPERIMENTAL TREATMENT (8 days play of 2 simulation games)	CONTROL TREATMENT (8 days reading and class discussion)	POST-TEST (questionnaire)
SCHOOL A (100% Negro)				
Teacher A-1				
Experimental (N=20)	X	X		X
Control (N=18)	X		X	X
Teacher A-2				
Experimental (N=19)		X		X
Control (N=20)			X	X
SCHOOL B (50% Negro)				
Teacher B-1				
Experimental (N=22)	X	X		X
Control (N=23)	X		X	X
SCHOOL C (few Negro)				
Teacher C-1				
Experimental (N=19)	X	X		X
Control (N=30)	X		X	X
Teacher C-2				
Experimental (N=36)		X		X
Control (N=30)			X	X

the teacher in this case was particularly interested in the project and the school did have the racial composition we wanted, we decided to compromise here rather than spend the time required to find a school that more exactly matched our ideal research design. Ideally, of course, one would have one teacher teaching all four classes in a given school (to control for teaching style and personal characteristics of individual teachers). However, since few schools have as many as four classes of any single course, at the same ability level or track, and such classes would not in any case be assigned to a single teacher, our best solution seemed to be to make certain that each of our teachers taught a pair of classes, one experimental and one control, matched on same subject and ability level.

Comparison of the aggregate statistics for the three school sub-samples, shown in Table 1, indicates that each sub-sample does have one or more characteristics which distinguish it from the others. In School A, as compared with the other two, a majority of respondents live in homes in which one or both parents is absent, although it does not contain any more family breadwinners at the bottom of the occupational ladder (unemployed or in unskilled jobs), and fewer parents are non-high school graduates than in School B, a school located in a working class neighborhood with unusually high residential stability. Consistent with the looser family structure characteristic of School A, relatively high proportions of the respondents do not know how much education their parents had. At the other extreme is School C, an academically oriented high school in a middle-class suburban area of Baltimore, which contains all but one of the parent college graduates in the total sample and in which a majority of the heads of households have white collar or professional jobs.

Note also that in Schools B and C, the proportion of Negro respondents

TABLE 1. Background Characteristics of Respondents, By School

<u>% of Respondents:</u>	SCHOOL		
	<u>A</u> <u>%</u>	<u>B</u> <u>%</u>	<u>C</u> <u>%</u>
Who are male	37	54	31
Who are Negro	100	25	4
Who live with both parents	45	82	86
Whose father (or male guardian)			
- did not graduate from high school	39	55	33
- graduated from college	3	0	20
- don't know	32	25	12
Whose mother (or female guardian)			
- did not graduate from high school	47	70	33
- graduated from college	0	0	10
- don't know	24	18	2
Whose father (or male guardian)			
- is unemployed or works at unskilled labor	42	59	16
- holds a white collar or professional job	21	16	61
Total Respondents	(77)	(45)	(115)

is smaller than the proportion of Negro students in the whole school. Since we asked in each case for classes in the middle ability track for that school, the underrepresentation of Negroes in our sample probably reflects the tendency for disproportionate number of Negro students to be assigned to lower ability classes in integrated schools!

Experimental and Control Group "Treatments"

All experimental classes participated in two simulation games developed at the Department of Social Relations, Johns Hopkins University: (1) the legislature level of "The Game of Democracy" (copyright 1965 by James S. Coleman); and (2) "Life Career" (copyright 1965 by Sarane S. Boocock). The first game was played during three consecutive class periods, the second for the following five days. Note that the games vary not only in length but also in the extent to which the content is directly applicable to the players' own lives. In "Legislature," these students took roles which few if any of them would ever actually assume in real life (and which would be in the distant future for the few who might pursue a political career). On the other hand, Life Career simulates situations and decisions which most of these students will have to make in their own lives within the next few years.

During the same eight-day period, all control classes read and discussed materials covering the same content as the two games used in the experimental classes. The readings were selected from textbooks and other materials obtained from the Baltimore Department of Education. That is, they represent a sample of reading materials currently being used in Baltimore social studies courses.

Preparation of Teachers

All of the teachers participating in the experiment were prepared in the following sequence of activities:

1) About a month before the beginning of the experiment, the five teachers attended a two-hour introductory work session at Johns Hopkins, at which members of the research staff:

- explained the general research design;
- described how experimental and control groups were designated (randomly except in the case of one teacher who insisted upon making the choice herself);
- described game playing materials;
- presented the two games actual playing materials. The teachers took sample materials away with them to go over on their own;
- reviewed the reading materials for the control classes. We made some changes in the reading assignments based upon suggestions by the teachers.

2) The teachers attended one or both of two one-day workshops conducted by members of the research staff at a local school as a means of introducing the simulation technique to a cross section of Baltimore teachers, counselors and administrators. (These workshops had fortunately been scheduled so that they fell on the two Saturdays just before the beginning of the experiment.) The workshops included some general orientation to the simulation gaming technique, demonstrations of seven games (including Legislature and Life Career) by Baltimore high school students, and participation in one or two of the games demonstrated.

3) During the week before the experiment began, members of the research staff visited each of the three school for additional meetings with the teachers. These lasted from 1/2 hour to two hours depending upon the amount of review of plans that was required and the number of questions and/or amount of anxiety individual teachers had about the experiment.

4) Questionnaires, materials for each game, and readings were delivered the day before they were scheduled for use and picked up after

they were completed or used. At this time, we checked with the teachers about how the experiment was going and answered questions, but we did not go into the classes while the experiment was in process.

Responses from the teachers themselves and the data on the effects of the experiment indicate that our preparation of teachers was not adequate. Our interpretation of the effects of inadequate teacher preparation upon the results of the experiment and our plans for supplementing it in future research will be discussed in the final section of this report, but we will only underscore here that this seems to us to be the weakest component of the entire experiment and to go far to explaining the relatively weak effects of the games in areas where we had predicted a stronger one.

Date Collection

Appendix A contains a copy of the data collection instrument given before and after the experimental and control group "treatments." The questionnaire consists of sets of items which have been used in our previous field work, which have been revised from previous questionnaires, or which we have since discovered which seemed particularly relevant to the variables we were attempting to measure.

The first eight pages consist of a set of semantic differential scales which are a device for measuring definitions of concepts basic to the game experiences. Following the semantic differential, items #1-13 are a set of previously tested items some oriented toward content knowledge and others toward sense of control with respect to the Life Career game. Items #14-24, adapted from a test used at the Pennsylvania Advancement School* is designed to measure whether players can apply

* An experimental residential school for underachieving boys, which has done extensive experimentation with Hopkins and other simulation games as a technique for teaching underachievers. For a description of this research program and analysis of data from one such experiment, see Farron, 1967.

the principles learned in the Life Career game to a slightly different hypothetical life situation. Items 25-35 measure knowledge and sense of control with respect to political action. Items 36-41 are the six control of destiny items used in the Coleman, Campbell et al. study, Equality of Educational Opportunity. Items 42-62 are selected from the 34-item IAR (intellectual achievement responsibility) scale for children, as used by Crandall et al. (1965). This seemed a particularly useful instrument since it contained items measuring children's feelings of control over the outcomes of play and games as well as regular school work. The last two pages, given only on the after questionnaire, ask for background information.

In addition to the questionnaire data, all respondents' class ranking, IQ score, most recent grade in this class, and race were obtained from the teacher or from school records.

As Figure A shows, while all classes were given the post-game questionnaire, one of the pairs of classes in Schools A and C (selected randomly) did not take the pre-test, which allowed us to examine a possible test effect of the first questionnaire.

The Ideal Model*

The basic design of our research is the Solomon Four-Group Design. When administered properly, this design enables one to measure not only the main and interaction effects of testing, but also the main effects of maturation or history. History refers to events other than experimental treatment which may influence posttest performance. In running the experiment contemporaneously for all groups, we have better control over the effects of history.

* We are grateful to the assistance given us by Julian Stanley in formulating this model.

The testing itself may have an effect in several ways. The pre-test may cue the subjects to be alert for the information discussed in a later appropriate situation. This appropriate situation soon arises in the form of the experiment. Another problem is simply carry-over of experience on pre-test tasks to the posttest. By use of posttest-only groups it is possible to analyze the main and interaction effects of pre-testing.

Although the basic model of the Four-Group Design was followed here, one critical requirement is missing. Randomization was not employed in assigning persons to groups. Whenever experimental and control groups do not have sample equivalence one has a compromise design, not a true experiment. Without randomization, then "other" unidentifiable effects may occur due to differences in the composition of groups.

Randomization is also important for the use of certain powerful statistical tests complimentary to the design, such as analysis of variance and covariance. The procedure also assists in assigning equal numbers of subjects to groups, another desirable aid for data analysis. Because we lacked such control over assignment, several of our groups are considerably larger than the others (notably at School C).

Although our design approximates the Four-Group design, we decided against using the more elegant statistical procedures. Although the experimental and control groups within each school are very similar on most background variables, there are differences in the sex distributions. (Females predominate in the experimental groups; males in the controls.) Knowing that sex has been demonstrated to be an important variable in game-playing (Vinacke, 1959, Joseph and Willis, 1963) and in conventional classroom achievement (Lavin, 1965), it appeared unwise to assume randomization. Also, such procedures are better applied when there is

more certain knowledge about the reliability of indicators than we had available.

As a result the techniques for analysis form are more wieldy. We have chosen to depend upon the use of multiple indicators and look for consistency across results. Decisions concerning the presence or absence of a relationship have been made by inspection rather than by significance tests. We have included as compete a selection of the data as appears feasible so that the reader can judge for himself whether our conclusions are justified.

1. The Meaning and Effects of Control Beliefs

A major finding of the Coleman et al. report, Equality of Educational Opportunity is the importance of a sense of control of environment for subsequent in-school achievement. In this section, we shall try to extend our understanding of the nature of this attitudinal variable by two kinds of analysis:

- treating control belief as a dependent variable, we shall study the degree to which differential attitudes can be explained by a set of background factors;
- treating control belief as an independent variable, we shall see whether it helps to explain differences in the information or skills students have at the beginning of the experiment (effects of control belief on actual performance in simulation games and the conventional classroom situation will be discussed in the next section (2) of this report).

Another, related finding of the Coleman report concerns the relationship between minority vs. majority group membership and control belief.

For children from advantaged groups, achievement or lack of it appears closely related to their self-concept; what they believe about themselves. For children from disadvantaged groups, achievement or lack of achievement appears closely related to what they believe about their environment: whether they believe the environment will respond to reasonable efforts, or whether they believe it is instead merely random or immovable. In different words, it appears that children from advantaged groups assume that the environment will respond if they are able enough to affect it; children from disadvantaged groups do not make this assumption, but in many cases assume that nothing they can do can affect the environment -- it will give benefits or withhold them but not as a consequence of their own action (Equality of Educational Opportunity, pp. 320-1).

As suggested earlier, for the minority group child, the belief that the environment is capricious may well be an accurate reflection of his opportunities to alter or control situations in a favorable direction.

While our sample was not intended to be representative of the Baltimore high school population, it can be considered as a kind of miniature replication of the Coleman thesis and an opportunity to study in somewhat

more detail, in a special sample, the components of this important variable. Or to look at it another way, the Coleman national sample can be used as a basis of comparison for our sample, as a means of identifying the extent and direction in which our respondents deviate from a national sample of age peers.

The first part of our analysis then will deal with the effects of the ascribed characteristics of race, socio-economic position, and sex upon sense of control of environment as measured in this Coleman report.*

Al. Control Belief as a Dependent Variable. There are three general trends with respect to the response characteristics of the national sample on the control items. Two findings were as predicted. (1) White respondents have a greater sense of control than Negro. (2) The higher the social status of the respondent, the greater the sense of control. The third finding was somewhat surprising: females have a greater sense of control than males. In general these relationships are additive. (The data is not presented here.)

Our data present some interesting deviations from the national sample. In Table 3 the measures of effect for each variable are presented. (Epsilon is simply a measure of the percentage difference in sense of control between the two relevant classifications, e.g., white-Negro, middle class-lower class,** male-female.) Most notably, on two items in our sample the Negroes have a much greater sense of control than

* Items 36-41 in the questionnaire, Appendix A. Analysis of the sources of control beliefs, including the same ascribed characteristics to be discussed here, in the national probability sampling of twelfth graders, is currently being performed by Clarice Stoll.

** For this rough comparison, all respondents whose father or male guardian was employed in a skilled labor or higher occupation were classified as middle class.

TABLE 3. Effects of Background Items Upon Control

	Epsilons		
	a Race	b Class	c Sex
36. "Luck": Good luck is more important than hard work for success. (Disagree)	.01	-.06	.02
37. "Others stop": Every time I try to get ahead, something or somebody stops me. (Disagree)	.04	.07	-.15
38. "Own fault": If a person is not successful in life, it is his own fault. (Agree)	-.17	-.05	.11
39. "No chance": People like me don't have much of a chance to be successful in life. (Disagree)	-.05	.03	-.09
40. "Accept condition": People who accept their condition in life are happier than those who try to change things. (Disagree)	-.21	.13	.11
41. "Right job": Even with a good education, I'll have a hard time getting the right kind of job. (Disagree)	.04	-.02	-.05

a A positive epsilon means whites are higher than Negroes.

b A positive epsilon means middle-class respondents are higher than lower-class.

c A positive epsilon means males are higher than females.

whites (38, 40). Also, the items for which in our sample little racial differentiation appears are the very ones in the national sample which show a definite racial effect.

With respect to class, there is a fair similarity between the differences appearing in our sample and those in the national. Middle-class respondents exhibit a greater sense of control in both samples on items 40 and 37, but there is little class differentiation for other items.

Our sample again deviates with regards to sex. On two items, 38 and 40, the males exhibit a greater sense of control than the females. On only two of the six items are the differences clearly in the direction of the national trend, with females having a greater sense of control than males.

There is more to the effects of race, class, and sex on sense of control than Table 3 indicates. First, race and class are correlated; hence one must be able to examine the possibility that the apparent effects of one variable are not actually reflections of the other. Secondly, individuals hold ascribed characteristics in combination, and present a patterning of attributes to others. The saliency of a particular attribute may vary within situations. (For example, the race of an apartment hunter is more salient than his sex from the renter's point of view.) If our simple propositions are correct, one is faced with the possibility that certain patternings or combinations of attributes present a series of experiences such that there is an interaction effect in the development of a sense of control. Some illustrative questions: Could the fact of being middle class and white compensate for the limitations of being female? Or, should we expect that lower-class Negro females will not only have the least sense of control over environment, but that the pro-

portion of such respondents with a low sense of self-destiny will be greater than predicted by use of an additive model?

Our sample's size precluded a classification of respondents on all three attributes simultaneously. Tables 4 through 6 show the proportion who respond positively to control items, holding constant two of the three attributes at a time. There are some conspicuous deviations between the responses of certain subgroups in our sample from those of the national sample.

The first table shows an interactive relationship between class and race. Among Negroes, lower-class respondents express higher sense of control than middle-class respondents on five out of the six items, while the relationship is in the reverse direction among whites (the per cents are higher for middle class than lower-class whites on all items). Racial comparisons with class held constant show that among lower-class respondents, Negro per cents are higher than whites on five out of six items, while the reverse is true in the middle-class group. Moreover, on all but one item lower-class Negroes exhibit greater sense of control than lower-class whites or middle-class Negroes. In the national sample whites have a greater sense of control than Negroes, regardless of class, on these four items. Secondly, unlike the national sample, girls show a consistently greater sense of control than boys on only one item (37).

Very likely the selection procedure accounts for some of the unusual characteristics of the sample. As mentioned previously, only middle-track students were included in the study. As a result, those Negroes in the sample are the highest Negroes in the schools by academic status. It should not be surprising then to see that the lower-class Negro respondents have a high degree of control, having achieved an unusually high level of success relative to others in their position. It is not

TABLE 4. Sense of Control by Class and Race

CLASS:	Lower		Middle	
	Negro (21)	White (29)	Negro (19)	White (56)
% who give positive answer to item:				
36. Luck	48	31	21	36
37. Others stop	71	59	58	77
38. Own fault	71	41	58	46
39. No chance	57	17	21	43
40. Accept condition	50	55	58	69
41. Right job	76	62	47	73

TABLE 5. Sense of Control by Sex and Race

	Female		Male	
	Negro (26)	White (51)	Negro (19)	White (34)
Proportion who give positive answer to item:				
36. Luck	35	33	26	35
37. Others stop	50	43	74	47
38. Own fault	69	78	63	59
39. No chance	38	39	39	26
40. Accept condition	40	60	53	71
41. Right job	65	72	63	65

TABLE 6. Sense of Control by Sex and Class

	Female		Male	
	Lower (24)	Middle (48)	Lower (26)	Middle (26)
% who give positive answer to item:				
36. Luck	42	31	35	31
37. Others stop	67	79	62	58
39. No chance	38	40	31	31
40. Accept condition	43	64	62	68
41. Right job	67	70	69	58

apparent though why the sex differences in our sample vary from those in the national sample, although this may be related in some way to the underrepresentation of boys in two of the three school samples (see Table 1).

One unintended advantage of the atypicality of our sample is that there are students with a high degree of control at all three schools. If our sample had reflected trends in the national sample, with Negroes having a low sense of control compared to whites, then there would be too little variation among respondents within the schools to study the effects of pre-experimental level of control on learning independently of the school.

Thus sense of control does seem to be related to background factors such as race, SES, and sex, but in more complex ways than suggested by the initial reporting of the Coleman findings.

A2. Pre-Test Knowledge. Turning then to control beliefs as an independent variable, we shall examine the effects which this variable, and the background variables just discussed in relation to control beliefs, have upon responses to the pre-test questionnaire. That is, if certain types of students enter the experimental situation more knowledgeable or with different feelings about the content of one or both of the simulation games, we would expect different patterns of reaction to and performance in the game.

In addition to finding out whether certain subgroups of the sample have an initial level of knowledge or set of attitudes different from the sample as a whole, study of pre-test responses are useful in other ways. First, the over-all distribution of responses is necessary for selecting items on which we should expect some change to occur. If most of the respondents are knowledgeable with respect to the material which is being

presented in the experimental treatment, then we can hardly expect any learning to occur. Secondly, it is useful to compare the responses to some of the statements to results of similar research on adolescents. This technique helps us again to estimate the ways in which our particular sample of adolescents is possibly unique, or atypical. Any generalizations from this sample to other samples of teenagers must be made in light of such peculiarities.

In order to simplify the presentation of findings, composite scales, combining responses to sets of related items, will be used in most of the following tables. These scales are either taken from the literature (e.g., the I scales) or constructed from items found in our previous research to be interrelated in meaningful ways. Data on individual items will be presented or described only when they seem to clarify our findings in some important way or when they differ markedly from the general trends reported.

The five composite indices which will be used in the following discussions are:

- 1) Career Knowledge Scale, a measure of the kinds of factual information which could be learned from the Life Career game (and the control group readings). A respondent's score shows the number of the following questionnaire items which he answered correctly: 2, 5, 6, 7, 8, 9, 11, 12, 13, 15, 16, and 17;
- 2) Legislature Knowledge Scale, a similar measure covering the content of the Legislature game. It is based upon questionnaire items 25, 27, 29, 30, 31, and 32;
- 3) Coleman Control Scale, which indicates how many of the six individual control of environment items from the Coleman study were answered in the direction of belief in control.
- 4) Positive I Scale, the number of items from the Crandall et al. scale (a) on which the respondent attributed his success to his own efforts (b) from among those which were worded in a positive way (e.g., doing well on a test, winning a game, solving a puzzle quickly). These are questionnaire items 42, 44, 45, 47, 49, 52, 54, 56, 59, 60, and 62;
- 5) Negative I Scale, the negative mirror image of scale (4). It measures the number of items from the Crandall scale (a) on

which the respondent attributed his failure to his own lack of effort (b) from among those which were worded in a negative way (e.g., doing poorly on a test, losing a game, failing to solve a puzzle). These are questionnaire items 43, 46, 48, 50, 51, 53, 55, 57, 58, 61, and 63, each of which represents the opposite, negative side of a pair item in the Positive I Scale. (For more details on this scale and its previous use in research, see Crandall et al., 1965. For a discussion of the interrelationships among the three control scales for this sample, see Appendix B.)

The effects of sense of control and family background, with school also controlled, upon career and legislature pre-test knowledge are shown in Table 7, which is a summary table of a regression analysis of the sources of pre-test knowledge.

The first point to be noted is that the proportion of variance in pre-test knowledge scores explained by these three types of factors varies for the two types of knowledge, in patterns which are consistent with the nature of the subject matter of the two games (and sets of readings). As noted earlier, the Life Career game involves problems and decisions which touch these students directly -- all of them will have to make career plans in the near future, even if this only means deciding to leave everything about one's career to fate. Moreover, the extent to which they have observed successful career planning and patterns, among their families, older friends, and other persons is in large part a function of the characteristics of their social environment (the number of persons at various educational and occupational levels, the type of family life and leisure time activities they see around them, and so on). Thus it makes sense that background, in particular social class, is the best predictor of career knowledge, that those who are most likely to be around people of higher educational, occupational, and social status would know more about its requirements and advantages.

Likewise the smaller but substantial contribution of sense of control to career knowledge is reasonable. Those who believe in their own power to

TABLE 7. Proportion of Variance in Pre-Test Knowledge by Sense of Control,
Background Variables and School

	<u>Career Knowledge</u>	<u>Legislature Knowledge</u>
Control Belief:	4.53	.88
Positive I	2.13	.72
Negative I	.04	.12
Coleman	2.36	.04
Background:	8.64	2.68
Sex	.06	.01
Class	8.46	1.53
Race	.04	.06
Grade Average	.08	1.08
School:	2.66	7.64
A	.53	.04
B	2.13	7.60
C		
Over-All	15.83	11.20

control their own destiny would presumably be more involved in the type of career planning the game is designed to provide.

By contrast with the Life Career game, the Legislature game (and the questionnaire items designed to test knowledge of its content) deals with processes and decisions with which few students, or their families, are directly involved. Here the only important explanatory variable is school, in particular attending School B. This was apparently a case of recent classroom learning on this topic. School grade average, while it does not account for a large portion of the variation, is more important in connection with legislature than career knowledge. Conversely, the family background proportion is much lower for legislative than career knowledge, probably reflecting the relative lack of experience of most people with politics. Sense of control accounts for almost none of the variance. If, as we have formulated, sense of control comes partly from real-life experience in which one sees one's own actions as having some effect on outcomes, then the well-documented lack of direct participation of most adolescents in any kind of political activity would make it unlikely that general sense of control would contribute much to political knowledge.

While Table 7 thus suggests that knowledge of the type which the two games are designed to communicate is gained through rather different learning paths, it should also be noted that in neither case do the background factors of sex and race account for more than a minute portion of the total knowledge score.

Analysis of the individual items comprising some of our composite scale provided some further clues about pre-test knowledge of the subject matter of the simulations. In connection with legislative knowledge, this more detailed analysis revealed no additional differences among types

of respondents in responses to the questions on legislative processes. What these responses do show is the generally low level of knowledge which respondents have in general. For example, items 25 through 29 constitute a projective device, designed to elicit the respondents' ability to recognize the complexity of legislative process in contrast to the simple, idealistic view that congressmen should vote on principle alone. Two congressmen were presented: one, Jones, was described as voting according to his convictions and the constituents' interests alone. The other, Smith, was described as voting in a similar way some of the time, but open to vote-trading in some circumstances. Thus Jones represents the idealistic (and unrealistic) view of a congressman.

While the majority of respondents (69%) thought that most congressmen actually behave like Smith, a majority (73%) also believed that congressmen ought to behave like Jones, the idealist. Thus the ideal prevails as a norm, even when respondents seem to recognize that the norm is not realistic. The same patterning appears in responses to questions concerning the actual versus preferred behavior of Jones. For example, only 14 per cent of the respondents believed that Jones would vote on the basis of both his own personal convictions and the constituents' interests, yet 45 per cent preferred that he utilize both interests in making his decisions.

With respect to actual legislative procedure, few respondents could give a reasonable explanation as to a circumstance under which Smith would trade a vote (27 per cent). Also, only 15 per cent could supply one of several possible reasons as to the way a bill can be kept from being voted on (such as filibustering, tabling the bill, killing it in committee). On the other hand, most respondents believed that the order in which a bill is presented would be important for its passage (88 per cent), and furthermore, that presenting a bill early in session would favor its passage (87

per cent).

In summary, except for those questions which deal specifically with the order of presenting a bill to the legislature, respondents are not highly knowledgeable about legislative procedure. While it is recognized that congressmen cannot always vote according to principle, the reasons for their deviation from the ideal are not understood. One suspects that the respondents might view such congressmen as being immoral or irresponsible. We should point out, however, that the generally low level of political sophistication, and the small amount of variation in knowledge or political orientation by social type is not unexpected. Literature on political socialization of adolescents documents the generally low level of political involvement by both adolescent and adults and suggests that activity in organization or discussion with a parent who is knowledgeable are more important for understanding adolescent political involvement than the combined strength of background factors such as sex, class and race.

A final point in connection with the Legislature game concerns questionnaire item 34, a question which measures not actual knowledge about legislative processes but rather the degree to which the individual feels that he can have some effect on these processes -- i.e., it is really an indicant of sense of control specifically with respect to politics. Table 8, which shows the proportion of negative responses to this item, controlling to pairs of background variables, suggests that political sense of control may also be related to ascribed characteristics. In our sample, the strongest effect is the racial one, with whites displaying consistently greater sense of political control than Negroes. This is as one would predict, but unpredictably, there are also fewer negative responses among lower than middle-class respondents and among

TABLE 8. Percentage of Respondents Who Agree That People Like Me Have No Say in Government, By Race and Class, and by Race and Sex

	Negro	White	€
Lower Class	86	44	42
Middle Class	95	65	30
€	-9	-21	

	Negro	White	€
Male	95	65	30
Female	85	54	31
€	10	11	

females than males.

The relatively strong trends in Table 8 suggest that it would be useful to explore this variable further, in particular comparing it with general sense of control as an independent variable related to game knowledge and performance. While Table 7 showed that a general sense of control of destiny did not account for much of the variation in pre-test legislative knowledge, it might be profitable to examine whether a feeling of control specifically referring to political power is a better predictor of legislative knowledge and performance. Some analyses of this sort will be presented in Section 3.

With respect to the questions aimed at information felt to be important elements of the Life Career game, the responses are more complex. First of all, there are several items which apparently were already common knowledge. For example, 89 per cent of the students agreed that the decisions made now may have a big effect on life in later years. This consensus is somewhat surprising because the lower class has been by many commentators described as "lacking future orientation." Possibly the belief is deducted from the observation that lower-class individuals often behave as though the future is not dependent upon the present. In addition, one interesting piece of common knowledge for our respondents (98 per cent) is their recognition that education is inversely related to the likelihood of divorce. Finally, few students were aware that a private liberal arts school is the most expensive post-high school (33 per cent) or the school with strictest entrance requirements (20 per cent).

Another set of questions about career planning resembles the type of simulation presented in the Career game itself. A profile of a boy, Tom, was introduced and a number of questions were asked with respect

to Tom's likely future behavior. Tom was described to be a capable, poorly-performing student. His economic status is suggested to be good and relations with his parents are implied to be favorable. Tom's major difficulty is with his teachers. His major interests are "automobiles and good clothes." In other words, Tom has the potential to be successful educationally, but he is preoccupied by other activities from handling his problem.

For most statements concerning Tom's behavior, there were no variations by social type of respondent. A majority believed that Tom should stay in school (61 per cent). Most students were aware that upon marrying, his wife would be his own age or a little younger (69 per cent). They less perceived that his wife would likely have the same amount of education as Tom (33 per cent) and be working (57 per cent). Most students would advise Tom to wait until 20 or older to marry (92 per cent). Furthermore, Tom would be advised to have three children or less (73 per cent). Most agreed that Tom's least satisfaction in life would be in his education (71 per cent). It is interesting that there is no variation by race, sex, or class in response to preferred family size, a finding which supports the hypothesis that the larger family size among lower class and Negro groups reflects unavailability or knowledge of contraception, not a preference among such subpopulations for larger families (HEW Indicators, 1966).

One type of question in the career section does elicit differences in response by race, class, and sex, as shown in Tables 9-12. These items are similar in that they all concern the interrelationship of the various spheres of life activity -- work, family, and leisure. In other words, these items tap the respondents' cognitions of the structuring of society -- his recognition of its complexity, the interdependence of

one type of decision upon another, and the implications of this interdependency for his own career planning. (Indeed a major intention of the Life Career game is to assist students in understanding the complex decision-making system within which he must operate,* and the game is designed so that there is a rough correlation between educational and occupation success and satisfaction in the realm of family and leisure activity.)

Table 9, 10 and 11 indicate a generally greater understanding of these interrelationships among Negro respondents. They are more likely to recognize that having children reduces resources of time and money in other areas, and this relationship holds when either class or sex is controlled (Table 9); they are more likely to recognize the relation of educational-occupational status and marriage opportunities when sex and race are controlled; and at both social class levels they are more likely to realize the effect of one's personal resources (of money and education) upon enjoyment of leisure time (Table 11).

In other words, what the tables as a whole seem to reflect is the Negro youngster's earlier or more direct experience of the realities of life. Unlike the more protected white student, he is more likely to have seen the consequences of having too many children and too little money or education.

Some other relationships in the tables also reflect the extent to which understanding of the situations simulated in the game is initially affected by previous real-life experience or roles. For example, in Table 9, in addition to the racial relationship, being lower class and being female also makes one more likely to recognize the effects of children upon

* Or that he must change if he does not like the present normative structure. In one of our more notable game sessions, one team of boys developed a winning strategy by having their person pass through a series of marriages!

TABLE 9. Percentage of Respondents Who Agree That Having Children Means That A Person Has Less Time and Money To Spend On Other Things By Race and Class, and By Race and Sex

	Negro	White	€
Lower Class	68	53	15
Middle Class	50	41	9
€	18	12	

	Negro	White	€
Male	50	43	7
Female	62	45	17
€	-12	-2	

TABLE 10. Percentage of Respondents Who Agree That The Kind of Person You Will Marry Depends On How Much Education And Which Occupation You Have By Race And Class, And By Race And Sex

	Negro	White	€
Lower Class	50	34	16
Middle Class	42	31	11
€	8	3	

	Negro	White	€
Male	50	41	9
Female	42	25	17
€	8	16	

TABLE 11. Percentage of Respondents Who Disagree That You Don't Need Money Or Education In Order To Enjoy Free Time

	Negro	White	€
Lower Class	73	62	11
Middle Class	90	72	18
€	-17	-10	

	Negro	White	€
Male	75	71	4
Female	85	77	8
€	-10	-6	

time and money resources. These findings are consistent with the greater likelihood of a large family and insufficient income in lower-class groups and with the greater involvement of the female role with children generally. Likewise, the lower-class group, having had more experience with too little money, are more likely to recognize its importance for enabling one to enjoy life (Table 11).

Finally, Table 12, shows responses to the semi-projective question asking respondents to indicate which of the four general life areas they would expect to be most satisfying for a fictitious boy who is described as having a rather hedonistic orientation toward life. It is the higher status (white or middle class) respondents -- i.e., those who have been more likely to observe in real life a varied, rewarding (and expensive) range of leisure time activities -- who are more likely to pick this as "Tom's" major source of satisfaction.

TABLE 12. Percentage of Respondents Who Say Tom Will Find His Greatest Satisfaction In His Leisure Activities by Race and Class, and by Race and Sex

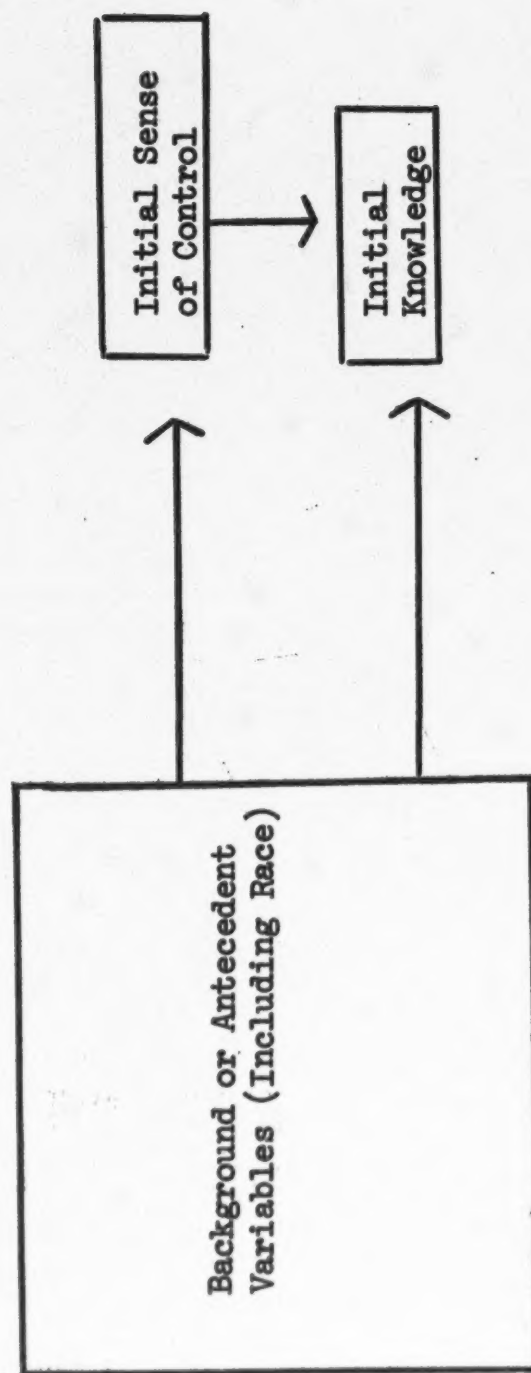
	Negro	White	€
Lower Class	36	32	4
Middle Class	62	60	2
€	-26	-28	

	Negro	White	€
Male	35	46	-11
Female	39	71	-32
€	-4	-25	

SUMMARY

Figure B shows the kinds of relationships we have analyzed in this section. Our data indicated that the student's background has meaningful effects both upon his feelings of control over his environment and his actual performance upon tests of his knowledge of career decision-making political process, although the effects involve interactive relationships among a cluster of ascribed characteristics rather than simple, direct uni-variable relationships. An individual's knowledge and skills were also shown to depend upon his control beliefs as well as his social background. These relationships were also complex ones, with the specific pattern of relationships dependent partly upon the subject matter to be learned and the school context. Finally, sense of control itself was seen to be a complex set of attitudes, ranging from a general sense of being in command of one's future to feelings of potency or adequacy with respect to particular areas of life (e.g., politics).

FIGURE B. Model for Analysis of Meaning and Effects of Control Beliefs



2. Effects of Exposure to Games

The focus of this section is the treatment variable of exposure to simulation games, and the following analysis will consist of a series of comparisons between respondents who were members of experimental groups with those who were taught the same subject matter by more conventional methods. The discussion will begin with a comparison of the amount of learning in experimental and control groups, then move to an examination of the relationships of learning and control beliefs, and finally incorporate the additional background variables which have already been found to be related to control beliefs.

B1. Amount of Learning. The most basic question is simply whether the experimental respondents learned as much or more than their controls. Table 13 shows these comparisons at both the aggregate and individual levels. The two left hand columns of Table 13 compare the mean scores on the Career Knowledge and Legislature Knowledge scales for experimental and control groups, before and after the experimental treatment. On both scales the control group gains are stronger than the mean score increases in the experimental group.

While mean scores are a useful summary device, they may obscure important patterns in the data, so we also examined changes in scores among individual respondents. The two right hand columns of Table 13 show what proportion of the individual respondents learned -- that is, displayed a higher posttest knowledge score. The pattern for the individual respondents is, however, the same as for the mean scores. Approximately half of both the experimentals and controls displayed higher posttest career knowledge scores. On the other hand, a full forty per cent of the experimentals unlearned with respect to legislative knowledge (in contrast to twenty-one per cent of the controls). Thirty-nine per

TABLE 13. Comparisons of Experimental and Control Groups on Career and Legislative Knowledge

	<u>Mean Knowledge Scores</u>		<u>% of Individual Respondents Whose Posttest Score Was:</u>	
	Pre-Test	Posttest	Higher than Pre-Test	Lower than Pre-Test
<u>Career Knowledge</u>				
Experimental	8.92	9.08	51	28
Control	8.76	9.35	50	25
<u>Legislative Knowledge</u>				
Experimental	3.69	3.72	28	40
Control	3.74	4.05	39	21

cent of the controls displayed an increase in knowledge posttest in comparison to only twenty-eight per cent of the experimentals.

From this latter data on individual patterns of learning, it appears that with respect to career knowledge the game and conventional techniques are equivalent in success. In contrast, the game appears to have had deleterious effects upon many subjects with respect to legislative knowledge in contrast to the conventional techniques which at least showed a modest success rate. Later in the section we shall examine external sources of posttest knowledge in order to elucidate the process of game learning versus classroom learning.

B2. Learning and Control Beliefs. Given that there was some learning in both the experimental and control groups, what are its sources, and do they differ for those who learned in the game compared to those who learned in the control situation?

Among the most important findings of the Coleman report was the high predictive power of feelings of control for actual performance on achievement tests. In our analysis, we attempted to examine the effect of control beliefs upon actual learning -- i.e., to see to what extent the belief in control of destiny a participant felt at the beginning of the experiment was related to the knowledge he or she had at the end -- and to see whether this effect differed in the experimental and control situation. Our results (data not shown) indicate no support for the predicted relationship between initial sense of control and subsequent learning. Even when we examined the individual items comprising the knowledge scales, there were few instances where those with a sense of control on the pre-test have a higher degree of knowledge on the posttest. In fact, the reverse is true on several items among the control respondents. (And since pre-test sense of control and pre-test knowledge are also not strongly related,

this lack of support for our hypothesis cannot be explained by a higher initial knowledge among those low in control beliefs.)

While this analysis has used control belief as the independent variable and learning or knowledge as the dependent variable, it is also possible to reverse the designation of variables -- to examine the effects of different modes of learning upon subsequent sense of control. It had been expected that the experimental subjects would display a greater sense of control over environment following game experiences in which their decisions were shown to have direct effects upon game outcomes. However, since this prediction was based upon extended or long-term experience in simulated environments, our actual field test, of shorter duration than we had originally planned and allowing for only a single play of a game, was not really an accurate test of this prediction. On the contrary, it is more reasonable to predict that a superficial, brief exposure to the game, in which the spinners and other "chance" devices often seem to be the dominant feature, would actually heighten one's belief in the caprice of social situations and environments.

Table 14, showing the relationships between experimental vs. control treatment and the three measures of sense of control, indicates no clear evidence that game experience either increases or decreases players' sense of control differently from the more conventional classroom situation. On the Coleman scale, the experimental subjects had a greater proportion who increased sense of control (thirty-one per cent) than the controls (twenty-two per cent), and fewer experimentals experienced a decrease in sense of control (thirty-one per cent, compared to thirty-eight per cent of the controls), but these differences are hardly impressive. Furthermore, the patterns are not replicated in the I scores.

If control is not the direct outcome of game exposure, it is still

TABLE 14. Change in Sense of Control in Simulation Vs. Regular Class

	Per Cent Whose Sense of Control		
	Increased	Decreased	(N)
Coleman Scores:			
Experimentals	31	31	(59)
Controls	22	38	(68)
I+ Scores:			
Experimentals	22	12	(59)
Controls	20	12	(68)
I- Scores:			
Experimentals	17	22	(59)
Controls	20	12	(68)

possible that the learning experience itself, whether through the game or conventional methods, leads to an increased sense of control. The relationship between changes in scores on the Legislature and Career Knowledge Scales and the Coleman Control Scale are examined in Table 15. Among those in the control groups who learned, it was most likely that an increase in sense of control also occurred (forty-four per cent for both legislative and career knowledge). However, those who unlearned in the control groups were equally likely to have a greater sense of control post-instruction (forty-three per cent and forty-seven per cent). In the experimental groups the relationships are different. Of those who learned legislative knowledge, a loss of control was more likely than a gain (fifty per cent and nineteen per cent), while those who lost knowledge were most likely not to change position with respect to control beliefs (fifty-eight per cent for legislative and fifty per cent for career knowledge). Clearly, sense of control does not emerge directly from learning. While it is likely to follow learning, at least by conventional methods, it is just as likely to follow a negative change in test scores. A similar pattern was found when change in I score is used as the measure of control (data not presented).

B3. Adding the Effects of Background Variables. Since we have already found that control is intricately related to background variables which may themselves influence learning, the preceeding analysis in which only one variable was controlled at a time, was not very satisfactory. In order to consider all the possible sources of learning included in the model and research design, several regression analyses were made. Post-test knowledge on the career and legislative items respectively was examined as dependent upon pre-test sense of control (I scores and Coleman scale), pre-test knowledge, grade average, sex, race, class, and the subject's school (which consisted of three dummy variables to treat the

TABLE 15. Changes in Pre-Test-Posttest Knowledge Scores by Changes in Pre-Test-Posttest Control Scores, in Experimental and Control Groups

		Experimental Group			Control Group		
Legislature Knowledge Posttest Score Is:		higher	same	lower	higher	same	lower
Control Posttest Score Is:							
higher		19	42	29	44	30	43
same		31	21	58	33	44	43
lower		50	37	13	22	26	14
		(16)	(19)	(24)	(27)	(27)	(14)

		Experimental Group			Control Group		
Career Knowledge Posttest Score Is:		higher	same	lower	higher	same	lower
Control Posttest Score Is:							
higher		30	38	25	44	18	47
same		40	24	50	35	47	41
lower		30	38	25	21	35	11
		(30)	(13)	(16)	(34)	(17)	(17)

effects of each school in contrast to the other two). The regressions were run separately for experimentals and controls as a means for identifying differences in game learning versus conventional learning.

Tables 16 and 17 present the proportion of variance in posttest knowledge explained by each of the variables. With respect to the effects of pre-test control upon learning, the results indicate that a sense of control over the environment -- whether measured by I score or the Coleman scale -- explains a small proportion of the variance in posttest knowledge. Two other variables make much greater contributions. As we would expect, pre-test knowledge is one major variable. It should be very surprising if a score on the posttest did not include that portion of information known on the pre-test. The other major predictor, perhaps surprisingly, is the school. More specifically, attending the all-white school, C, explains a considerable proportion of variance in posttest knowledge. Background variables are of least importance, and of these, only race appears consistently to affect learning.

In comparing the importance of the variables in the experimental to the control subjects, several dissimilarities are notable. These differences occur for both career and legislature knowledge. First, pre-test knowledge explains much more variation for learning by conventional methods than by the game method. Secondly, the school or learning environment is more important for explaining posttest knowledge in the game as against the classroom situation. This is particularly true for learning legislative knowledge. Finally, although race explains only a minor part of the variance in learning by either method, it is more important for the game.

B4. Change in Semantic Differential Items. Before summarizing the results of Section 2 we shall just mention another type of game effect

TABLE 16. Proportion of Variance in Posttest Career Knowledge, By Experimental Treatment, Sense of Control, Background Variables, And School

	Post Career	
	Ex	Con
Control:	3.05	1.05
Positive I	.90	.61
Negative I	1.22	.13
Coleman	.93	.31
Pre-Test Knowledge:	13.29	25.43
Background:	2.84	1.08
Sex	.58	.60
Class		
Race	2.26	.48
Grade Average		
School:	25.50	18.96
A		3.33
B		
C	25.50	15.63
Over-All:	44.68	46.52

TABLE 17. Proportion of Variance in Posttest Legislative Knowledge, By Experimental Treatment, Sense of Control, Background Variables, And School

	Post Legislative	
	Ex	Con
Control:	2.77	4.89
Positive I		.44
Negative I	2.13	4.42
Coleman	.64	.03
Pre-Test Knowledge:	17.52	22.09
Background:	2.79	3.18
Sex		1.69
Class		.40
Race	2.79	.34
Grade Average		.75
School:	39.21	10.89
A	.51	1.52
B		
C	38.70	9.37
Over-All:	62.29	41.05

which we considered but which will be treated in greater detail in Section 3. This was the change in conceptual organization of subjects toward a number of objects referred to in the games: self, politics, my future, learning, luck, congressman, fun, and planning ahead. There were no specific hypotheses concerning the change we expected. Rather, we wanted to use the material to assist in understanding game experiences. The items selected for the scales were selected to measure the respondents' attitudes along three dimensions: his evaluation of the object (good, pleasant), his perception of the activity of the object (active, lively), and his attribution of power to the object (strong, tough). Three additional scales were idiosyncratic in nature: interesting, honest, daring.

Two forms of analysis were made. One compared the mean scores for each item per concept to see the direction of movement, if any, before and after experimental treatment. Thus one could see whether, for example, "planning ahead" was viewed as more interesting post-game, or, whether congressmen were perceived to be less honest. Some differences did occur in the experimental groups in contrast with the control. However, since further analysis with school held constant showed that these changes occurred differently at each of the three schools, we shall defer further discussion of the game effects until the subsequent section of the report.

Another technique permitted us to look at the distances between concepts before and after experimental treatment. Following Osgood's formula (1957), conceptual distances were computed on the basis of the responses to the evaluation, activity, and potency items. The purpose of this analysis was to examine whether the conceptual organization of the concepts reorganized as a result of the game or conventional learning experience. The procedure would permit us to see whether, for example, politics and self became more closely related in conceptual definition.

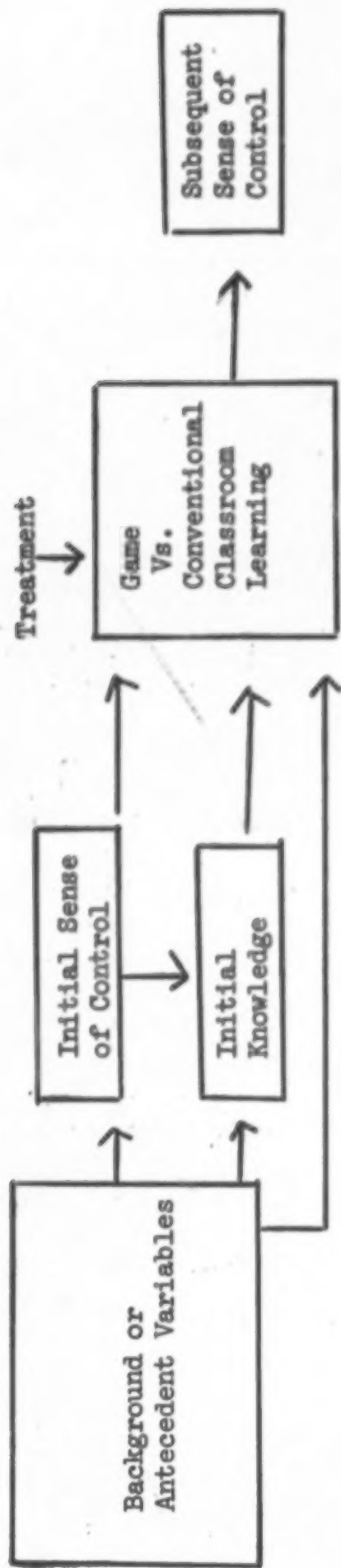
The results in general showed that all distances between the concepts decreased following the experiment. There were no school or experimental treatment variations. Given this consistent lack of variation, and similar movement across all items, it seems plausible that the shrinkage in conceptual distance is related to unreliability of the measure or to a test effect, rather than to any actual change in respondents' cognitive sets.

SUMMARY

In the preceeding section, we have expanded our exploration by introducing the treatment variable of simulation games vs. readings and other conventional classroom activities and have examined the effects of the two treatments upon both learning and changes in sense of control. Figure C shows the directions in which our model has evolved.

Our findings did not show any advantages of the games over regular classroom activities, at least for the exposure allowed in this experiment. Rather regression analyses indicated that learning is explained by a more complex set of variables, including initial knowledge and background factors as well as teaching technique. This analysis also indicated that aggregating the data from all the schools conceals some important information about the dynamics of learning. This leads us to Section 3 in which many of these relationships will be re-examined in the light of the school context in which they occur.

FIGURE C. Model for Analysis of Effects of Exposure to Simulation Game



3. Effects of School Context

Although we have not yet directly examined the effects of the various schools in which the experiments were conducted, we have already obtained clues that this variable may explain part of the variance in learning and attitudes. (E.g., we have seen that school context was a major predictor of pre-test knowledge in connection with the Legislature game.) In this section we shall consider the simultaneous effects of school and treatment variables upon: extent of learning; changes in conceptual orientation; and changes in control beliefs.

Cl. Degree of Learning. In Section 2, we saw that while there was over-all learning in the classes using conventional learning methods, increases in learning seemed to occur only in connection with career knowledge in the simulation groups. Table 17 shows this same analysis with school held constant for the three different schools.

The left two columns of Table 17 present the mean knowledge scores, pre-test and posttest, by school and experimental treatment. For career knowledge, the scores are notably higher on the posttest for three groups: School B control, and School C, experimental and control. If one looks at the proportion of subjects whose posttest career knowledge increased, in the right hand columns, one sees that the experimental group at School B also had a high ratio of individuals who improved their career learning scores relative to the per cent whose scores dropped. (Apparently the net decrease in mean scores was caused by a severe drop in score among a small number of individuals.) At School A there was as much unlearning as learning, by either teaching method.

With respect to legislature knowledge, a more negative set of re-

sults appear. The mean scores presented in Table 17 show an increase again for the controls in School B and C, and the experimentals in School C. On the other hand, for the other three subsamples, post-test knowledge scores decrease. The individual learning patterns reveal the underlying trend. Of those who change in School A and the experimental group in School B, most unlearn pre-test knowledge.

In addition to examining mean scores and individual change patterns, the items composing the over-all scores were examined individually. The purpose of this analysis was to discover if there were any outstanding deviate items in the scale. In other words, could the mean changes and individual pattern changes obscure the actual pattern of learning and unlearning? In fact, there is a remarkable consistency between the patterns of change in the learning of individual items as reflected in the over-all measures (data not shown). The controls at Schools B and C, and the experimentals at School C are likely to show increase in knowledge on each item. The experimental group at School B is likely to show an increase of career knowledge, but not of legislature knowledge. Both treatment groups at School A show little learning, and more likely, unlearning of individual items.

What explains these differences across schools? There are several plausible interpretations, and while none can be substantially tested with our present data, we can make some educated guesses based upon field experiences.

One possibility is difference in teacher effectiveness. One could interpret the general lack of success at School A to ineffective teaching (or conversely, the generally positive effects at School C to the high quality of the teaching regardless of the particular teaching method used). However, our impression from our work with the teachers

before and during the experiment is that, if anything, the teachers at School C were more anxious about the whole project and more resistant to the notion of simulations. We had, in fact, expected the most positive results at School A because of the teachers involved in the project there. As further support for our contention that teacher effect was not a main source of variation, the posttest-only groups display a level of knowledge comparable to that found within their respective schools. (See Appendix C for data.) Thus both teachers at School A had the same lack of success, and both teachers at School C had the same success.

The within-school similarity in results suggests the possibility that the student composition at the three schools is relevant. Even though all of the students are in the middle track, the students at School A have lower IQs and grade averages than those at the other two schools. These scores reflect a lower achievement in academic situations. The failure of the School A subjects to respond to either technique could then be simply part of a general pattern of poor academic achievement.

Another problem which may have confounded the findings is the actual treatment situation. From our experience, there is a wide variation in the extent to which games at the early stages "go well." It may be that the particular grouping of students at School C consisted of the -- as yet unknown -- qualities which make a game viable from the start without protracted orientation periods. Unfortunately, we have no information as to the degree to which the game playing may have varied across the schools.

Another possible explanation for the higher rates of learning at School C is pre-test effect. Pre-test exposure requests for information may interact with experimental treatment and thus falsely increase post-

TABLE 17. Comparison of Experimental and Control Groups on Career and Legislature Knowledge, By School

	<u>Mean Knowledge Scores</u>		<u>% of Individual Respondents Whose Posttest Score Is:</u>		
	Pre-Test	Posttest	higher than pre-test	lower than pre-test	change ratio*
SCHOOL A					
Career Knowledge					
Experimental	8.89	8.84	33	33	.00
Control	8.59	8.65	41	41	.00
Legislature Knowledge					
Experimental	3.74	3.53	22	50	-.38
Control	3.82	3.24	18	35	-.32
SCHOOL B					
Career Knowledge					
Experimental	8.33	8.14	55	14	.59
Control	8.29	8.86	52	29	.38
Legislature Knowledge					
Experimental	3.24	2.90	32	45	-.17
Control	3.24	3.62	29	19	.21
SCHOOL C					
Career Knowledge					
Experimental	9.74	10.42	63	16	.59
Control	9.20	10.10	53	13	.61
Legislature Knowledge					
Experimental	4.21	4.79	26	26	.00
Control	4.03	4.83	60	13	.64

* Change Ratio =
$$\frac{\# \text{ higher minus } \# \text{ lower}}{\# \text{ changes}}$$

test scores. All of our posttest measures were also on the pre-test.

(Some unfamiliar items would have been a useful independent check.)

There is also the memory effect of the pre-test and students at School C, being the more facile learners to begin with, are most prone to a response based upon previous experience with the task. In fact, data in Appendix C indicate that some pre-test effects may have occurred at School C, but not at School A, the other school with posttest-only groups.

If the results are related to teacher, student, or game variables, then the hypothesis under consideration are not invalidated. Rather, we are led to consider that there are particular conditions under which it operates and to design further research on these possible conditions. If, however, the results are primarily the result of measurement error, then a devastating conclusion results: there was no learning by either technique within any of the diverse settings. The possible validity of this latter explanation is weakened when School B is considered. In this setting one game appears to have had some effect. Further on we shall see other reasons to believe that the school and treatment variations in learning reflected in our data are not spurious.

C2. Conceptual Reorganization. Another type of game effect considered by the study is that of basic conceptual reorganization. It was not unexpected that the games as played for a short period in this study would have similar, not necessarily better, success than conventional techniques in transmitting factual-type knowledge. It is our contention though that the games would also induce changes of a basic conceptual nature unlikely through traditional learning techniques. Active participation through games in contrast to the passive conventional classroom experience seems to be in light of past research a more likely set-

ting for attitude reorganizations.*

The semantic differential scales were used to measure one type of basic conceptual change -- the subject's definition of relevant objects in terms of their attractiveness, potency and activity. In our analysis of the respondents' definitions before and after experimental treatment, one consistent trend appeared: experimental groups at Schools A and B exhibited a redefinition of several objects, while the controls did not. There were some minor differences between experimental and control at School C, though not of the degree.

Tables 18 through 25 present the mean scales positions on the pre-test and posttest for each concept by school and treatment. Careful inspection of the tables suggest the following results.

1) School A: There are clear differences between experimental and control groups in the redefinition of most of the concepts. With respect to the following concepts -- planning ahead, future, learning, self, congressman, politics -- the experimentals are likely to move in the direction of defining the objects as more attractive, strong, and active. The controls are not likely to change position at all, and in some instances, move in the reverse direction.

2) School B: Here there are fewer instances where the experimentals

* The games are not quite the "group decision" situation typical of research on attitude change, but they do include many characteristics of a group-decision setting: issues which involve a course of action; free discussion; feedback on attempts to obtain information; final decisions which force an individual to make some final commitment; the opportunity to test new actions. Conventional classroom settings resemble "lecture" conditions of such experiments. Students form a relatively passive audience; are not required to make decisions on issues; are unable to perceive others' attitudes not of the same degree. Participation is much more self-initiated than in the game. For a review of research on groups as agents of attitude change, see Secord and Backman (1964).

TABLE 18. Semantic Differential

Mean Scores for Planning Ahead, By School

	Experimental Pre-Test	Posttest	Control Pre-Test	Posttest
<u>SCHOOL A</u>				
good	5.80	6.40	6.44	6.33
strong	5.00	6.05	5.28	6.00
active	5.25	5.45	5.94	5.89
tough	4.45	4.20	4.22	3.94
pleasant	5.20	6.25	6.00	6.00
lively	5.25	5.75	5.50	5.28
<u>SCHOOL B</u>				
good	6.61	6.09	5.91	6.56
strong	6.04	5.96	5.52	6.13
active	6.13	5.74	5.52	6.04
tough	4.52	4.48	5.09	5.30
pleasant	5.87	6.30	5.78	5.83
lively	5.61	5.61	5.78	6.04
<u>SCHOOL C</u>				
good	5.74	6.26	6.03	6.28
strong	4.74	5.63	5.55	5.55
active	5.11	5.32	5.38	5.44
tough	4.00	4.63	4.83	5.20
pleasant	5.11	4.73	5.55	5.31
lively	4.53	5.42	5.00	5.14

TABLE 19. Semantic Differential

Mean Scores for Future, By School

	Experimental Pre-Test	Posttest	Control Pre-Test	Posttest
<u>SCHOOL A</u>				
good	6.20	6.75	6.28	6.11
strong	6.10	6.20	5.67	5.83
active	5.45	6.30	6.11	6.39
tough	3.90	3.40	4.28	3.83
pleasant	6.15	6.55	6.17	5.89
lively	5.95	6.05	6.11	5.94
<u>SCHOOL B</u>				
good	6.04	6.00	6.09	6.00
strong	5.83	5.57	5.74	5.86
active	6.30	5.87	5.96	6.34
tough	4.17	4.09	5.17	4.83
pleasant	6.17	6.00	5.91	5.83
lively	6.17	5.61	6.04	5.74
<u>SCHOOL C</u>				
good	5.84	6.00	5.69	5.66
strong	5.37	5.63	5.83	5.55
active	5.73	5.21	6.00	5.76
tough	3.63	3.89	4.62	4.83
pleasant	5.74	5.68	5.28	5.55
lively	5.74	5.53	5.89	5.72

TABLE 20. Semantic Differential

Mean Scores for Learning, By School

	Experimental Pre-Test	Posttest	Control Pre-Test	Posttest
<u>SCHOOL A</u>				
good	5.65	6.45	6.11	6.17
strong	4.50	5.45	5.28	5.61
active	5.55	6.05	5.50	5.39
tough	4.80	4.05	4.28	4.39
pleasant	5.55	5.60	5.72	5.94
lively	5.40	5.00	4.89	5.93
<u>SCHOOL B</u>				
good	5.17	5.70	5.91	5.78
strong	5.22	5.52	5.34	5.43
active	4.83	5.30	5.91	5.78
tough	4.56	4.13	5.30	5.61
pleasant	4.91	5.39	5.39	5.91
lively	5.48	5.35	5.04	4.87
<u>SCHOOL C</u>				
good	5.84	6.21	6.28	6.21
strong	5.37	5.53	5.45	5.62
active	5.79	5.10	5.21	5.66
tough	3.63	4.94	5.41	5.14
pleasant	5.74	4.32	4.52	4.52
lively	5.74	4.42	4.41	4.69

TABLE 21. Semantic Differential

Mean Scores for Me, By School

	Experimental Pre-Test	Posttest	Control Pre-Test	Posttest
<u>SCHOOL A</u>				
good	5.75	6.25	5.28	5.33
strong	5.10	6.05	4.89	5.17
active	5.65	6.05	5.94	5.72
tough	2.95	3.55	3.89	3.83
pleasant	6.60	6.45	5.94	5.94
lively	6.50	6.30	6.17	6.00
<u>SCHOOL B</u>				
good	4.70	4.65	5.35	5.39
strong	4.78	5.13	5.13	5.13
active	5.17	5.91	5.87	6.26
tough	4.17	4.52	4.52	4.70
pleasant	5.21	5.34	5.91	5.73
lively	6.04	5.65	6.04	6.17
<u>SCHOOL C</u>				
good	4.84	5.21	4.79	4.97
strong	4.42	4.47	4.72	5.00
active	5.00	5.21	5.17	5.79
tough	3.58	3.47	3.38	3.69
pleasant	5.16	5.58	3.52	5.31
lively	5.16	4.89	5.38	5.38

TABLE 22. Semantic Differential

Mean Scores for Fun, By School

	Experimental Pre-Test	Posttest	Control Pre-Test	Posttest
<u>SCHOOL A</u>				
good	6.65	6.80	6.72	6.33
strong	6.40	6.30	6.11	5.33
active	6.40	6.10	6.67	6.00
tough	2.75	3.20	4.83	4.06
pleasant	6.70	6.50	6.33	6.11
lively	6.50	6.05	6.28	5.83
<u>SCHOOL B</u>				
good	6.78	6.30	6.74	6.26
strong	6.43	6.09	5.91	5.22
active	6.87	6.09	6.48	5.91
tough	4.30	4.22	4.65	4.52
pleasant	6.70	6.43	6.57	5.95
lively	6.43	6.17	6.61	6.00
<u>SCHOOL C</u>				
good	6.79	6.68	6.24	6.28
strong	6.16	5.89	5.79	5.69
active	6.68	6.63	6.48	6.52
tough	4.26	4.00	4.00	3.90
pleasant	6.84	6.68	6.62	6.45
lively	6.84	6.53	6.62	6.34

TABLE 23. Semantic Differential

Mean Scores for Luck, By School

	Experimental Pre-Test	Posttest	Control Pre-Test	Posttest
<u>SCHOOL A</u>				
good	5.05	5.85	4.50	5.33
strong	4.00	5.30	4.22	4.61
active	3.70	4.70	4.33	5.56
tough	4.20	3.65	4.61	3.44
pleasant	4.60	5.50	5.17	5.50
lively	3.95	4.40	4.89	5.17
<u>SCHOOL B</u>				
good	4.35	4.91	4.43	5.09
strong	4.39	4.83	4.43	4.30
active	4.70	4.87	4.35	4.73
tough	4.39	4.74	3.91	5.13
pleasant	4.43	4.57	4.65	4.96
lively	4.61	4.83	4.65	5.00
<u>SCHOOL C</u>				
good	5.58	5.16	4.79	5.21
strong	4.53	4.42	4.65	4.12
active	4.16	4.10	4.41	4.66
tough	3.74	4.21	4.38	4.72
pleasant	5.37	5.00	4.66	4.62
lively	4.47	4.79	5.31	4.90

TABLE 24. Semantic Differential

Mean Scores for Congressman, By School

	Experimental Pre-Test	Posttest	Control Pre-test	Posttest
<u>SCHOOL A</u>				
good	5.30	5.80	5.39	5.39
strong	5.25	5.75	5.72	4.89
active	5.00	5.55	6.44	5.61
tough	5.35	4.80	5.44	5.05
pleasant	5.30	5.25	5.83	5.50
lively	4.45	5.30	5.39	4.89
<u>SCHOOL B</u>				
good	5.43	4.52	5.61	5.22
strong	5.43	4.48	5.13	5.30
active	6.04	4.70	5.30	5.48
tough	5.13	4.70	5.22	5.22
pleasant	5.00	4.35	5.04	4.96
lively	5.39	4.65	5.18	5.08
<u>SCHOOL C</u>				
good	4.53	4.53	4.24	4.41
strong	4.53	4.74	4.59	5.38
active	5.26	5.36	4.72	5.93
tough	4.58	5.11	4.75	5.65
pleasant	4.53	4.11	3.90	4.52
lively	4.89	5.05	4.41	5.59

TABLE 25. Semantic Differential

Mean Scores for Politics, By School

	Experimental Pre-Test	Posttest	Control Pre-Test	Posttest
<u>SCHOOL A</u>				
good	4.45	5.15	5.22	5.17
strong	5.00	5.35	4.78	4.72
active	4.70	4.40	5.50	5.28
tough	4.95	4.70	4.89	5.00
pleasant	4.35	5.40	4.61	4.56
lively	4.40	5.30	5.34	5.39
<u>SCHOOL B</u>				
good	4.39	4.60	4.30	4.83
strong	5.30	5.22	5.13	5.00
active	4.48	5.30	5.56	5.22
tough	5.43	5.26	5.13	4.91
pleasant	4.35	4.26	3.91	4.30
lively	5.39	5.04	5.08	4.91
<u>SCHOOL C</u>				
good	3.68	3.26	3.86	3.69
strong	4.74	5.05	4.89	4.96
active	5.31	5.47	5.24	5.62
tough	6.05	5.74	5.86	5.86
pleasant	2.42	3.10	2.59	3.14
lively	5.79	5.58	4.76	5.34

and controls differ. For learning and self, the experimentals redefine in a direction similar to School A experimentals, viewing these objects as more attractive, active, and strong. On two other items, though, School B experimentals redefine in the opposite direction. They are likely to see planning ahead and congressman as less attractive, active, strong. The differences in experimental effect on the redefinition of these two objects suggests that the games at each school took different paths or styles. For example, something may have occurred in the development of the Legislature game to give the School A players a positive reorientation toward congressmen, yet School B players a negative one.

Two concepts redefined by School A game players were not at School B -- future and politics. Again, we are led to presume that the course of the games at the schools may account for the lack of redefinition.

3) School C: In most cases the School C respondents changed position little. When it occurred, movement was similar in both experimental and control groups.

The controls appeared to move differently on self than the experimentals. School C experimentals have a more positive self-concept posttest, while controls have a more potent, active self-concept posttest. Also, unlike the changes at Schools A and B, it is the controls who redefine congressman as more attractive, strong, active -- not the experimentals.

This brief survey of the changes in conceptual definition points out that the games did have some effect in contrast to the classroom situation, at least in School A, and probably in School B. What is interesting is that conceptual redefinition did not result at the school where games proved successful in producing factual learning.

Perhaps the School C subjects saw the games as educational devices and thus did not immerse themselves as fully as School A and B game players. Varying commitment to the game process would also explain the ease with which School C players were able to express that they had learned. School A and B players may have still been too preoccupied by the novelty of the game experience to recognize its instructional qualities. This explanation is conjecture at this point and suggests the need for research on variations in individual commitment to the game in itself.

The results on conceptual reorganization support our contention that games induce different ways of seeing one's self and the concepts underlying the game situations. Traditional learning techniques are aimed at instructing a student to recognize the logic of how concepts relate to one another, e.g., the organization of a legislature. Games are a procedure not only for supplying the system of relationships, but for reshaping the player's definition of the objects which are being related. Thus we would expect a student who takes programmed instruction on the legislature to learn about its structure and functions. Yet we would not expect him to hold quite different attitudes toward congress and politics as a result. Basic conceptual changes result from relating one's self more directly to the topic at hand, as through a simulation.

One problem though is that a brief experience with the games might produce changes of an indeterminate nature. If the first few rounds of a game "go well," then it is probable that conceptual redefinition would be different from that if the game had gone poorly. To give an illustration, the nature of the Democracy game is such that in early periods the players are likely to find deception a useful technique. However, a particular group of players may cohere well and set the more normal

type of bargaining off rather quickly. It seems plausible that players in the first instance would devalue politics, while players in the second instance would not.

This is not to imply that conceptual redefinitions would be unpredictable. Two conditions were missing from our experiment which would ensure that players' redefinitions could better be predicted. First, if the games are played over a sufficient time period, then the effects of any one round's idiosyncracies in content should be lessened. Thus we would expect that any players who play the Democracy game long enough will move toward some basic definition of congressman and politics.

Secondly, post-game discussion can assist in correcting the biased perspective any one player has developed. Thus a player who had had a streak of bad luck in the Career game would find in later discussion that most other players had been able to control many of their actions. His attitude toward planning ahead would no doubt change more positively from post-game to post-discussion.

C3. Sense of Control and Learning. In a preceding section we saw that one hypothesis with respect to control beliefs was not supported by the analysis over all subjects. It was not true, as predicted, that there was a posttest increase in control for the game players. In fact, as many subjects lost as gained control following the game. Is this pattern repeated when we look at the respondents by school?

Table 26 shows that there is little difference by school in pattern of change in control beliefs. The game players are as likely to gain as lose in amount of control, when measured by the Coleman scale. The classroom subjects in this case are more likely, if they change at all, to increase in degree of control.

With regards to the Positive I scores, there is little difference

TABLE 26. Percentage Change in Sense of Control By School And Treatment Group

	SCHOOL A		SCHOOL B		SCHOOL C	
	Ex (18)	Con (17)	Ex (22)	Con (21)	Ex (19)	Con (30)
Coleman Scale						
Increased	39	35	23	43	32	37
Decreased	33	18	27	19	32	27
Positive I						
Increased ^a	21	29	27	29	16	10
Decreased ^a	11	6	5	10	21	17
Negative I						
Increased ^a	16	35	27	10	5	20
Decreased ^a	42	6	18	10	5	17

a. Movement at least 2 points in score

in the direction of change. Both treatment groups within each school change in a similar manner -- towards an increase in control at Schools A and B; towards a decrease at School C.

The distributions of change are less clear with respect to Negative I control. Many of the game players at School A exhibited a loss of control of this type, while the classroom subjects increased. Change at the other schools is as likely to be in one direction as in the other.

Given the lack of consistency across results by the various indicators of control, it is difficult to draw sure conclusions. Conservatively speaking, we can say that the hypothesis concerning game effects upon control beliefs was not supported.

Perhaps the findings would be clearer if we knew what had occurred during the games. There could have been something about individual responses to the uncertainty of the game situation such that sense of control was affected. Could those who gained in sense of control have been those who caught on quickly? Or, were those who lost in sense of control those who found the brief exposure confusing? We have no data to test these possibilities.

All three indicators -- the Coleman scale and I scores -- are global measures of control. The Coleman items refer to a general fatalism; the I scores to control over intellectual achievement. It could be argued that change in these general predispositions would require a more profound experience than our brief experimental treatments. What, then, of the possibility that sense of control over the content areas treated by the games increased?

Two items on the questionnaire tapped sense of control with respect to each game problem. One item focuses on a basic goal of the Career game; awareness of the effects of one's decisions on future

life course. "It is almost impossible to plan your life in advance, because so much depends on luck or chance." When we look at the change in response to this item by school and treatment group (Table 27), it appears that an increase in sense of control is most likely among those three groups for which there was also learning of career knowledge: School B control, School C experimental and control.

A comparable patterning results when we examine the change in sense of control with respect to the government. Table 27 again shows the individual change patterns by school and group for responses to the item. "People like me have no say about what the government does." In this case, individuals from the three groups in which there was unlearning of legislature knowledge are likely to display less control, if they change at all. Again, in the three groups in which learning occurred, individual changers are likely to increase in sense of political control.

Does this mean then that individuals who learned are also likely to have an increased sense of control? It turns out that this is not the case. As with our findings in Section 2 - B2, those who have learned are not more likely to have experienced an increase in sense of control than those who unlearned (data not presented). Nor is it true that of those who increased in sense of control that there was any greater likelihood to have learned than for those who did not experience a change in control beliefs.

In other words, there is something about the climate of groups which stimulate learning -- whether in the game or the classroom -- such that there is a heightened sense of control specific to content area. This is some type of group phenomenon, because it is not necessarily those individuals who learn who gain in sense of

TABLE 27. Percentage Change in Content-Relevant Control By School and Treatment

	SCHOOL A		SCHOOL B		SCHOOL C	
	Ex (20)	Con (18)	Ex (22)	Con (23)	Ex (19)	Con (30)
Career Control (Item 1)						
Increased	15	11	14	22	21	17
Decreased	10	17	9	-	5	3
^a C.R.	+.20	-.21	+.20	+1.00	+.76	+.70
Legislature Control (Item 34)						
Increased	5	6	5	17	21	23
Decreased	10	16	13	5	5	4
^a C.R.	-.33	-.45	-.44	+.55	+.76	+.70

a The change ratio =
$$\frac{N(\text{increased control}) - N(\text{decreased})}{N(\text{changed})}$$

control. Our data provide no clues on whatever it is about the group process that induces both learning and increased sense of control.

C4. A Note on Racial Context. It was stated in the introduction that one purpose of the study was to consider the results in view of the racial segregation of schools. This is one reason why the sample of schools was selected to include an integrated school, B. It happens though that while School B is about half Negro, our two groups are only twenty per cent Negro. Given the small numbers of Negroes in these samples, it was not possible to make the types of comparisons we had hoped for, notably, a comparison of Negroes at the integrated school with those at the all-Negro school.

We did address one question: did the Negroes at the integrated school perform similarly to the over-all pattern of performance at the school? Table 28 presents the mean scores on knowledge and control scales, pre-test and posttest, for the Negroes at School B. Not only are the patterns of change in this subsample similar to those of the larger sample, but the mean values are very close to those of the respective group means.

The similar performance level of the Negro students to their fellow classmates recalls McPartland's (1967) findings concerning the effects of classroom desegregation on the academic achievement of Negroes. He found that school desegregation alone would not be beneficial to achievement growth of the Negro students. Rather, it is important that the Negro attend predominately white classes in order for there to be a beneficial effect.

It would be interesting to investigate the extent to which games could contribute to the further communication between Negro and white students at desegregated schools. In the conventional classroom it is

TABLE 28. Mean Scores On Knowledge and Control Scales For School B Negroes

<u>Mean Score For</u>	Experimental (N=4)		Control (N=5)	
	Pre-Test	Posttest	Pre-Test	Posttest
Career Knowledge	8.0	8.0	7.2	8.6
Legislative Knowledge	3.0	2.8	3.6	3.8
Coleman Control	3.8	3.8	3.2	3.6
Positive I	8.5	9.3	6.6	6.8
Negative I	8.3	7.5	8.0	8.4

possible to maintain unintentional spatial segregation and avoid cross-racial work groups (whenever the class does break up into sections). For many classes there are few opportunities where the class behaves as one interactive unit. Games, however, have a democratizing effect in that each individual must take some role and interact with many other role partners. Furthermore, the structures of the games are such that it is not possible to say that one particular role is "better" or of higher status than another. Thus games may be much more than an alternative teaching technique; they might be devices for establishing a cohesive classroom unit.

SUMMARY

Figure D presents the summary model of the various relationships explored in the study. This section focused upon school context as it contributed to variations in the treatment effects.

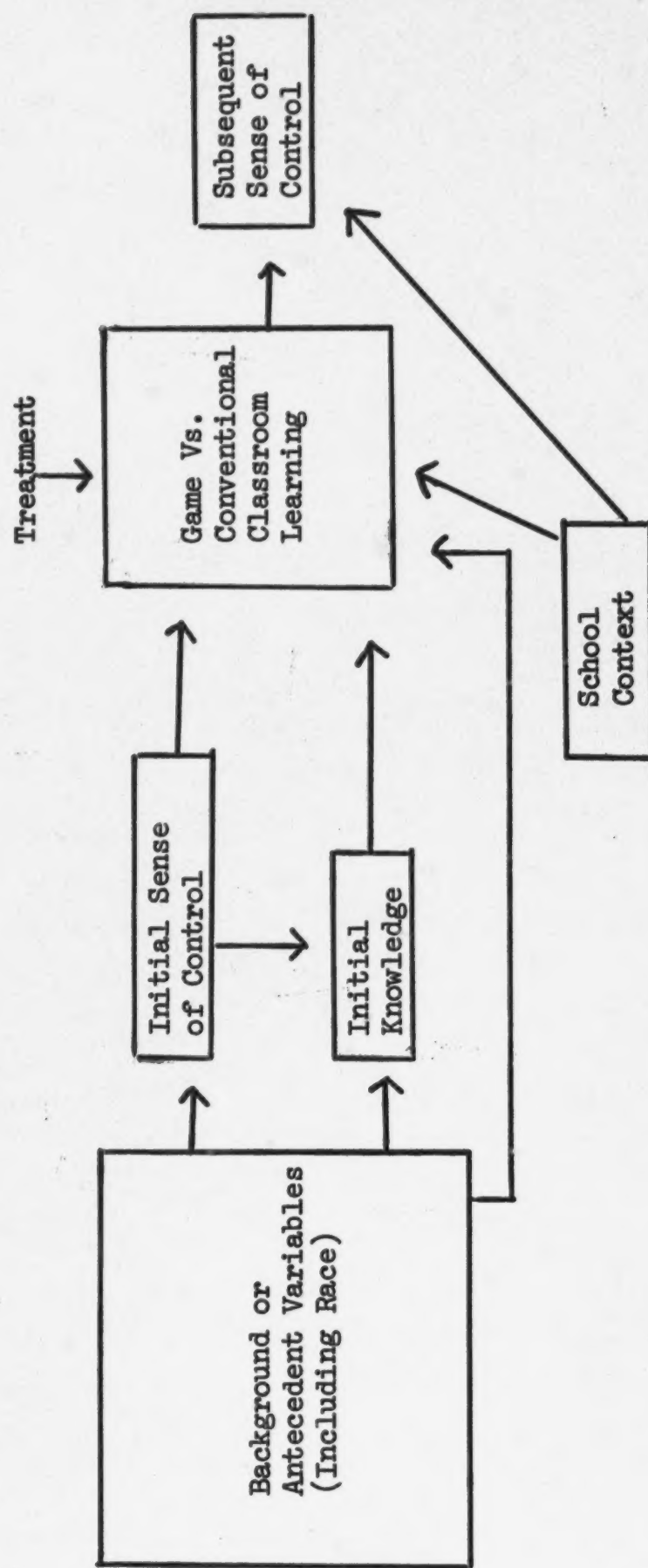
We found that the two educational techniques were roughly equivalent in producing learning (or loss of it). The games worked well with those who learn well by conventional methods, the advantaged students at School C.

Our findings suggest that games have other types of effects not produced by standard classroom techniques. Players' experiences apparently induce redefinitions of concepts basic to the simulations.

Sense of control of a global sort is not related to game experience on the basis of our results, though there does seem to be some development of a sense of control over specific spheres of activity among members of groups which stimulate learning, whether game groups or classroom groups.

Finally, we learned that the Negroes at the integrated school did not perform any differently from those in their respective groups.

FIGURE D. Summary Model: Analysis of Effects of Exposure to Simulation Games Vs. Conventional Classroom, Taking Into Account Racial Context



CONCLUSIONS

Given that our results as a whole indicated far less, and less direct, impact of simulation games than we had hoped, we shall use this concluding section in which to specify the points at which our research design or techniques were weakest and to indicate ways in which we are attempting to overcome these weaknesses.

First, the length of exposure to these two games was clearly inadequate. While most research on games to date has concentrated upon one game over a relatively short period of time, it now seems clear that any real effects upon learning and upon such a deep-seated feeling as one's sense of control would require such longer exposure to the simulation technique, preferably with a number of different games. (In the particular time limits within which we worked, it might have been preferable to introduce only one game and to allow more than one play and/or follow-up discussion and reading.)

It could also be that games may be much more effective for many students when supplementary or reinforcing activities are added. This possibility has been suggested by observation of otherwise "unsuccessful" students playing games. One sees them making very shrewd moves -- and making them repeatedly enough to indicate that they are not simply random or lucky moves -- but they are seldom able to explain in words what they did. This phenomenon has been discussed by Bruner, who found that students are often able to perform intellectual tasks requiring the use of quite abstract rules or theories well before they can say what these rules or theories are. For example:

It can be demonstrated that fifth-grade children can play mathematical games with rules modeled on highly advanced mathematics; indeed they can arrive at these rules inductively and learn how to work with them. They will flounder,

however, if one attempts to force upon them a formal, mathematical description of what they have been doing, though they are perfectly capable of guiding their behavior by these rules (Bruner, 1960, p. 38).

Of course, the highest order of understanding means not only being able to act effectly but also being able to say what you are doing. What we wish to make clear here, though, is that these are two distinguishable kinds of performance. The analysis in Section 3 of this report has suggested that while the games did not seem to be more effective than regular classroom activities in increasing factual learning, they did seem to have some distinctive effects upon players' cognition of certain underlying concepts. The research implication is that it will not be possible to test our belief in the importance of gaming for certain types of students without designing some ways to measure different kinds of learning.

It may also be that games per se are intrinsically limited in their effect -- that, in Bruner's terms, they may induce "enactive" and "iconic" learning but do not lead the player to symbolic representation. If so, they should be linked to other devices which may produce the kinds of desired learning which they do not do directly alone.

The preceeding paragraphs have raised two different issues -- (1) the problem of clarifying what sorts of learning games do produce most effectively and (2) the possible need of reinforcing the game activities with other kinds of activities which will fill in the kinds of learning that games do not handle well. Two lines of research activity are suggested. In connection with the first problem, we are now convinced that we have reached a cul-de-sac with our present research design and measurement instruments. Our best strategy is not to attempt further large-scale, controlled experiments with before-after questionnaires (i.e., tests external to the actual game experience) until we have carried

out a number of small game sessions, over a longer period of time. During these sessions we would observe, tape portions of playing sessions, and use the actual sequence of players' decisions and actions as data on the learning process.* (This kind of systematic recording of game sessions has more general relevance than just improving evaluation of simulations. That is, it will also contribute to the larger problem of measuring classroom behavior and dynamics, an area which is still underdeveloped.)

In connection with supplementing the game materials, during the past few months we have rewritten teachers' manuals for Life Career and one of our other games (Consumer), so that group discussion, readings, and other reinforcing activities are presented as part of the game "unit." For example, in each manual there is a section listing relevant discussion questions, with suggestions on when to use them and how to handle discussion with different types of students.

Another kind of supplementary material is being explored in connection with the programmed teaching device developed by Catherine Garvey, another associate of the Research and Development Center. While her work has been in linguistic instruction, we are currently exploring the possibility of using this device in conjunction with various levels of the Democracy game. It would assist in giving players short drills in the content of the issues used in the game. Using the audio component can allow students practice in strategies of parliamentary procedure. Both procedures will raise a player's

* As an example of this type of research, Gerald Zaltman related the degree of game-learning to the players' style of participation in the game. In his study of the Consumer game, he found that players' knowledge about creditors was a function of their degree of borrowing during the game. "Degree of Participation and Learning in a Consumer Economics Game," forthcoming in Simulation Games in Learning, Sarane S. Boocock and E. O. Schild, editors.

chances of performing well in the game.

Finally, it is clear that we need to do extensive preparation of most teachers before we can expect them to handle most simulation games correctly and without anxiety. As in the case of any other innovative teaching technique, adequate preparation requires more than just learning the rules of a given game. If a teacher is to use a simulation game in the manner intended, he must not only familiarize himself with the equipment and the rules, but also change his perception of the students in some rather basic respects. E.g., an important assumption underlying the technique is that students can be autonomous, self-motivating, and self-regulating with regard to their own learning to a much greater extent than is normally assumed -- and allowed. Because the rules are in the game itself, rather than being imposed by the teacher's authority, and because the outcome of the game, not the teacher, decides the winner, control of the class shifts from the teacher to the learning materials themselves -- and in a sense ultimately to the students. While this shift in control could lead to a more productive exchange between students and teachers, it could also be very threatening to those (both teachers and students) accustomed to more authoritarian methods of teaching.

Among our activities oriented toward more effective teacher training is a three-session workshop to be conducted by members of our staff at the National Council for the Social Studies annual meetings in Seattle (November 24-25, 1967). We are trying some new approaches in this workshop (in addition to having a longer period of training time than usual). For example, rather than giving the usual introductory lecture on the philosophy and nature of simulation as a technique, we are opening with a playing session, so that all following discussions and lectures (and observation of student playing sessions) will be based upon actual (and

common) experience of the workshop participants. In other words, we are trying to put into practice in the workshop some of the principles of gaming that we claim are its most significant components.

In conclusion, this research has led us to shift our interests from the pragmatic question as to whether games induce learning to the more basic one of how learning occurs. Games are not only useful educational devices, but also techniques for studying the educational process itself.

APPENDIX A

THE JOHNS HOPKINS UNIVERSITY
DEPARTMENT OF SOCIAL RELATIONS

This questionnaire is the final part of an experiment being conducted by the Department of Social Relations at Johns Hopkins University.

Your answers will be considered strictly confidential. These questionnaires will be taken directly to Johns Hopkins, and nobody but the researchers in the Social Relations Department will see them. Thus you can answer freely, in perfect confidence that nobody who knows you will see your questionnaire.

Please answer every question. It may be hard to make up your mind about some of the questions -- even so, please answer, and do not skip any question.

Some of you filled out questionnaires at the beginning of the experiment. Don't worry about how you answered them -- just answer each of these questions the way you feel today.

Thank you for helping us in this research.

YOUR NAME _____

On each of the following pages you will find a word on the top of the page, and below the word a series of scales like this:

HOUSE

big / / / / / / / / small

Go through the scales, and show by a check mark on each how you feel when you think of the word at the top. For example, if you think of something very big when you hear of a "house", you should check

big / ✓ / / / / / / / small

If you think of something neither big nor small but in between, you should check

/ / / / ✓ / / / /

Or, if you think of something slightly more "small" than "big", you should check

/ / / / / ✓ / / /

Work rapidly: don't think too much about each scale, but just check what first comes to your mind. Please check all scales, even if they don't seem appropriate.

ME

good

/ / / / / / / /

bad

weak

/ / / / / / / /

strong

active

/ / / / / / / /

passive

tough

/ / / / / / / /

tender

unpleasant

/ / / / / / / /

pleasant

still

/ / / / / / / /

lively

interesting

/ / / / / / / /

uninteresting

dishonest

/ / / / / / / /

honest

cautious

/ / / / / / / /

daring

POLITICS

good

/ / / / / / / /

bad

weak

/ / / / / / / /

strong

active

/ / / / / / / /

passive

tough

/ / / / / / / /

tender

unpleasant

/ / / / / / / /

pleasant

still

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lively

interesting

/ / / / / / / /

uninteresting

dishonest

/ / / / / / / /

honest

cautious

/ / / / / / / /

daring

MY FUTURE

good

/ / / / / / / /

bad

weak

/ / / / / / / /

strong

active

/ / / / / / / /

passive

tough

/ / / / / / / /

tender

unpleasant

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interesting

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uninteresting

dishonest

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honest

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daring

LEARNING

good

/ / / / / / / /

bad

weak

/ / / / / / / /

strong

active

/ / / / / / / /

passive

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LUCK

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strong

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passive

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daring

CONGRESSMAN

good

/ / / / / / / /

bad

weak

/ / / / / / / /

strong

active

/ / / / / / / /

passive

tough

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tender

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daring

FUN

good



bad

weak



strong

active



passive

tough



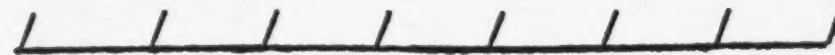
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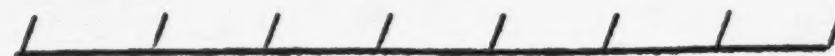
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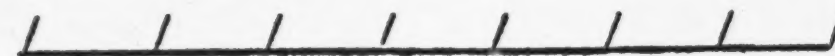
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honest

cautious



daring

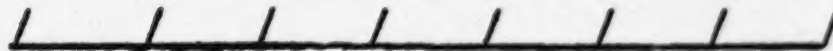
PLANNING AHEAD

good



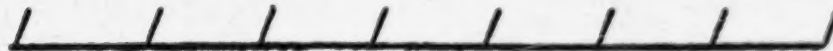
bad

weak



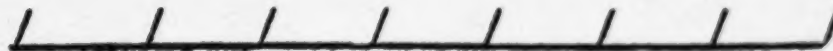
strong

active



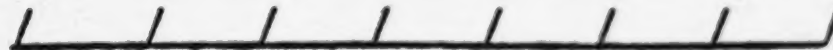
passive

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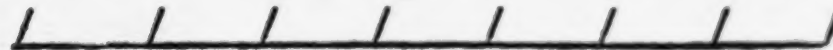
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unpleasant



pleasant

still



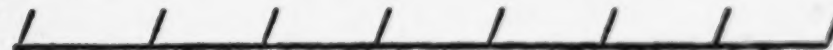
lively

interesting



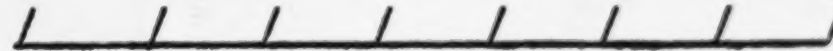
uninteresting

dishonest



honest

cautious



daring

DO YOU AGREE OR DISAGREE WITH THE FOLLOWING STATEMENTS:

1. It is almost impossible to plan your life in advance, because so much depends on luck or chance.

_____ I agree strongly.
_____ I agree.
_____ I disagree.
_____ I disagree strongly.

2. The decisions you make right now may have a big effect on your life in later years.

_____ I agree strongly.
_____ I agree.
_____ I disagree.
_____ I disagree strongly.

3. You don't need money or education in order to enjoy free time.

_____ I agree strongly.
_____ I agree.
_____ I disagree.
_____ I disagree strongly.

4. You can't get a satisfactory job these days without having a college education.

_____ I agree strongly.
_____ I agree.
_____ I disagree.
_____ I disagree strongly.

5. The kind of person you will marry depends on how much education and which occupation you will have when you marry.

_____ I agree strongly.
_____ I agree.
_____ I disagree
_____ I disagree strongly.

- 6 Having children means that a person has less time and money to spend on other things.

_____ I agree strongly.
_____ I agree
_____ I disagree
_____ I disagree strongly

7. The more education a person has, the more likely it is that his marriage will end in divorce.

_____ I agree strongly.
_____ I agree
_____ I disagree
_____ I disagree strongly.

8. An occupation which offers a good job today will also do so in 20 years.

_____ I agree strongly.
_____ I agree.
_____ I disagree
_____ I disagree strongly.

9. Most jobs at the same income level have the same requirements.

- ☐ I agree strongly.
- ☐ I agree.
- ☐ I disagree.
- ☐ I disagree strongly

10. Who can expect to get further education after high school?

- ☐ Only those who have very good grades in high school.
- ☐ Only those whose parents have plenty of money.
- ☐ Almost anyone who really wants it can get some education after high school.
- ☐ I don't know.

11. Which of the following schools is the most expensive?

- ☐ State University
- ☐ Community College
- ☐ Private Liberal Arts School
- ☐ Trade School
- ☐ Business or Secretarial School
- ☐ All About the Same
- ☐ Don't Know

12. Which of the following schools requires the highest grades to get in?

- ☐ State University
- ☐ Community College
- ☐ Private Liberal Arts School
- ☐ Trade School
- ☐ Business or Secretarial School
- ☐ All About the Same
- ☐ Don't Know

13. Is there any kind of further education a person can get if he or she hasn't graduated from high school?

☐ no

☐ yes If you checked yes, which kind of education?

NOW WE WILL DESCRIBE A PERSON TO YOU AND ASK YOU SOME QUESTIONS ABOUT
HIS FUTURE AS YOU SEE IT

Automobiles and good clothes are important in Tom's life. He is a good looking boy. Tom is almost 17 years old, and much sought after by both boys and girls. His gang is composed of boys who, like himself, do not like school and who have been in some minor trouble with the police.

Tom's main pleasure in school is annoying his teachers, and he has spent many class periods in the principal's office. In the required social studies class, he would not listen to the teacher and either pretended to be asleep or read books in an obviously defiant manner. He failed this course, and only the combined efforts of his parents, the principal, and his counselor kept him from dropping out of school.

Last year (10th grade) Tom did find one teacher -- an art teacher -- who seemed to understand him. He liked the informality of art class and the activities in this class so much that he has elected another art class this year.

Actually, Tom probably could do much better in school than his report cards indicate. His scores on intelligence tests show that he has at least average ability in all areas. However, he is pretty much down on adults in general, and he feels that teachers are people who flunk students, fuss about unimportant things like homework, credits and grades, but who know nothing about such important things as driving a car, drinking beer, going hunting, and being a sharp dresser.

Tom's father owns a pretty successful trucking company. A trucker's life appeals to Tom, and his father has encouraged these feelings. He lets Tom drive when one of the truckers is sick, and consequently Tom missed 25 days of school last year.

Tom's father attended school for only 7 years, but he encouraged Tom, his eldest son, to finish high school and go on to college. (He didn't, however, require Tom to attend school regularly or show any real concern over his son's good grades.) An older sister left school before graduation to marry, and two brothers, age 7 and 12, are in school. His mother is a high school graduate, but she shows little concern over Tom's school difficulties and she covers up for him when there are unexplained absences from school.

QUESTIONS 14 - 24 ARE ALL ABOUT TOM.

14. What do you think Tom should do next year?

_____ Leave school and get a full-time job (What kind of job?
_____).

_____ Leave school and enlist in the Armed Forces.

_____ Stay in school and do pretty much the same he did this
year.

_____ Stay in school, but take different courses (What kind of
courses?). _____

_____ Go to another kind of school (Which?). _____

_____ Something else (What?). _____

15. If Tom gets married, what kind of girl do you think he will marry?
First -- how old will she be?

_____ Same age as Tom.

_____ A little younger.

_____ A lot younger.

_____ A little older.

_____ A lot older.

16. How much education will she have?

_____ The same amount as Tom

_____ Less than Tom

_____ More than Tom

17. Will she be working?

_____ Yes

_____ No

18. At what age do you think Tom ought to get married?

19. How many children would it be best for him to have?

20. Which occupation do you think would be best for Tom?

21. And what would be second best?

22. How much free time a week do you think would be best for Tom?

- ☐ 5 hours or less
- ☐ 6 - 8 hours
- ☐ 9 - 11 hours
- ☐ 12 - 14 hours
- ☐ 15 - 17 hours
- ☐ 18 and more

23. In what area of life do you think Tom will find his greatest satisfaction?

- ☐ In his job
- ☐ In his family life
- ☐ In his leisure activities
- ☐ In his education
- ☐ Equally in them all

24. And in what area do you think he will find least satisfaction?

- ☐ In his job
- ☐ In his family life
- ☐ In his leisure activities
- ☐ In his education
- ☐ Equally in them all

THE FOLLOWING QUESTIONS ARE ABOUT THE KINDS OF THINGS THAT HAPPEN IN A
LEGISLATIVE BODY LIKE CONGRESS.

Two Congressmen were discussing how they worked. Congressman JONES explained: "I study each bill as if it were the only one brought up in Congress, and decide (according to my convictions as well as my constituents' interests) how to vote on this bill. I would never agree to political 'deals.'"

Congressman SMITH, on the other hand, said, "On some bills I do as Congressman JONES does. But on others I trade my vote to other Congressmen in return for their support."

25. How do you think most Congressmen actually behave?

_____ Like Congressman JONES

_____ Like Congressman SMITH

26. How do you feel Congressmen ought to behave?

_____ Like Congressman JONES

_____ Like Congressman SMITH

27. Consider again Congressman JONES. What do you think actually influences his decision the most:

_____ His own convictions

_____ The interests of his constituents

_____ Both equally

28. What do you feel ought to influence his decision the most?

_____ His own convictions

_____ The interests of his constituents

_____ Both equally

29. Consider again Congressman SMITH. On what issues do you think he will trade his vote, rather than decide on the merits of the issue?

30. Do you think the order in which bills are brought to the floor has any effect on which get passed and which get defeated?

_____ The order is very important

_____ The order is somewhat important

_____ The order is unimportant

31. If a Congressman is very interested in having a bill passed, do you think he would like to have it brought to the floor early or late?

_____ Early

_____ Late

_____ It doesn't matter

32. Sometimes a bill can be proposed in Congress but is never brought to a final vote on the floor. In which ways can one keep a bill from being voted on?

33. Sometimes politics and government seem so complicated that a person like me can't really understand what's going on.

_____ I agree strongly

_____ I agree

_____ I disagree

_____ I disagree strongly

34. People like me have no say about what the government does.

- ☐ I agree strongly.
- ☐ I agree
- ☐ I disagree
- ☐ I disagree strongly

35. Somebody once said, "The most successful legislator is the one who always breaks his promises." Do you agree?

- ☐ I agree strongly
- ☐ I agree
- ☐ I disagree
- ☐ I disagree strongly

PLEASE EXPLAIN YOUR ANSWER TO QUESTION 35.

DO YOU AGREE OR DISAGREE WITH THE FOLLOWING STATEMENTS:

36. Good luck is more important than hard work for success.

- _____ I agree strongly.
- _____ I agree.
- _____ I disagree.
- _____ I disagree strongly.

37. Every time I try to get ahead, something or somebody stops me.

- _____ I agree strongly.
- _____ I agree.
- _____ I disagree.
- _____ I disagree strongly.

38. If a person is not successful in life, it is his own fault.

- _____ I agree strongly.
- _____ I agree.
- _____ I disagree.
- _____ I disagree strongly.

39. People like me don't have much of a chance to be successful in life.

- _____ I agree strongly.
- _____ I agree.
- _____ I disagree.
- _____ I disagree strongly.

DO YOU AGREE OR DISAGREE WITH THE FOLLOWING STATEMENTS:

40. People who accept their condition in life are happier than those who try to change things.

_____ I agree strongly.
_____ I agree.
_____ I disagree.
_____ I disagree strongly.

41. Even with a good education, I'll have a hard time getting the right kind of job.

_____ I agree strongly.
_____ I agree.
_____ I disagree.
_____ I disagree strongly.

THERE ARE NO RIGHT OR WRONG ANSWERS TO THE FOLLOWING QUESTIONS; CHOOSE THE ANSWER THAT BEST DESCRIBES HOW YOU FEEL.

42. When you do well on a test at school, is it more likely to be

_____ because you studied for it, or
_____ because the test was especially easy?

43. When you have trouble understanding something in school, is it usually

_____ because the teacher didn't explain it clearly, or
_____ because you didn't listen carefully?

44. Suppose your parents say you are doing well in school. Is this likely to happen

_____ because your school work is good, or
_____ because they are in a good mood?

THERE ARE NO RIGHT OR WRONG ANSWERS TO THE FOLLOWING QUESTIONS; CHOOSE THE ANSWER THAT BEST DESCRIBES HOW YOU FEEL.

45. Suppose you did better than usual in a subject at school. Would it probably happen
- _____ because you tried harder, or
- _____ because someone helped you?
46. When you lose at a game of cards or checkers, does it usually happen
- _____ because the other player is good at the game, or
- _____ because you don't play well?
47. If you solve a puzzle quickly, is it
- _____ because it wasn't a very hard puzzle, or
- _____ because you worked on it carefully?
48. Suppose you study to become a teacher, scientist, or doctor and you fail. Do you think this would happen
- _____ because you didn't work hard enough, or
- _____ because you needed some help, and other people didn't give it to you?
49. When you learn something quickly in school, is it usually
- _____ because you paid close attention, or
- _____ because the teacher explained it clearly?
50. When you find it hard to work arithmetic or math problems at school, is it
- _____ because you didn't study well enough before you tried them, or
- _____ because the teacher gave problems that were too hard?

THERE ARE NO RIGHT OR WRONG ANSWERS TO THE FOLLOWING QUESTIONS; CHOOSE THE ANSWER THAT BEST DESCRIBES HOW YOU FEEL.

51. When you forget something you heard in class, is it
_____ because the teacher didn't explain it very well, or
_____ because you didn't try very hard to remember?
52. Suppose you weren't sure about the answer to a question your teacher asked you, but your answer turned out to be right. Is it likely to happen
_____ because she wasn't as particular as usual, or
_____ because you gave the best answer you could think of?
53. When you don't do well on a test at school, is it
_____ because the test was especially hard, or
_____ because you didn't study for it?
54. When you win at a game of cards or checkers, does it happen
_____ because you play real well, or
_____ because the other person doesn't play well?
55. Suppose you don't do as well as usual in a subject at school. Would this probably happen
_____ because you weren't as careful as usual, or
_____ because somebody bothered you and kept you from working?
56. Suppose you became a famous teacher, scientist or doctor. Do you think this would happen
_____ because other people helped you when you needed it, or
_____ because you worked very hard?

THERE ARE NO RIGHT OR WRONG ANSWERS TO THE FOLLOWING QUESTIONS; CHOOSE THE ANSWER THAT BEST DESCRIBES HOW YOU FEEL.

57. Suppose your parents say you aren't doing well in your school work. Is this likely to happen more

_____ because your work isn't very good, or

_____ because they are feeling cranky?

58. Suppose you are showing a friend how to play a game and he has trouble with it. Would that happen

_____ because he wasn't able to understand how to play, or

_____ because you couldn't explain it well?

59. When you find it easy to work arithmetic or math problems at school, is it usually

_____ because the teacher gave you especially easy problems, or

_____ because you studied your book well before you tried them?

60. When you remember something you heard in class, is it usually

_____ because you tried hard to remember, or

_____ because the teacher explained it well?

61. If you can't work a puzzle, is it more likely to happen

_____ because you are not especially good at working puzzles, or

_____ because the instructions weren't written clearly enough?

62. Suppose you are explaining how to play a game to a friend and he learns quickly. Would that happen more often

_____ because you explained it well, or

_____ because he was able to understand it?

THERE ARE NO RIGHT OR WRONG ANSWERS TO THE FOLLOWING QUESTIONS; CHOOSE THE ANSWER THAT BEST DESCRIBES HOW YOU FEEL.

63. Suppose you're not sure about the answer to a question your teacher asks you and the answer you give turns out to be wrong. Is it likely to happen

_____ because she was more particular than usual, or

_____ because you answered too quickly?

64. How old are you? _____ years

65. Sex: _____ Male

_____ Female

66. Do you live with _____ both parents

_____ father only

_____ mother only

_____ neither

67. What is your father's (guardian's) occupation? _____

68. What is your mother's occupation? _____

69. How far in school did your father go?

- ☐ None, or some grade school
- ☐ Completed grade school
- ☐ Some high school, but did not graduate
- ☐ Graduated from high school
- ☐ Technical or business school after high school
- ☐ Some college but less than 4 years
- ☐ Graduated from a 4 year college
- ☐ Attended graduate or professional school
- ☐ Don't know

70. How far in school did your mother go?

- ☐ None, or some grade school
- ☐ Completed grade school
- ☐ Some high school, but did not graduate
- ☐ Graduated from high school
- ☐ Technical, nursing, or business school after high school
- ☐ Some college but less than 4 years
- ☐ Graduated from a 4 year college
- ☐ Attended graduate or professional school
- ☐ Don't know

APPENDIX B

Appendix B: Measurement of Sense of Control

Given that sense of control was the major focus of the original design, two approaches to measuring the concept were included on the questionnaire. One is a set of attitude items taken from the Coleman report on educational opportunity. The other set of items were taken from a set composing the I (for internality) scale developed by Crandall et al. The contents of the scales are quite different.

Several of the Coleman items refer to the environment as being capricious, with any achievement being a matter of luck. Others attribute failure to some deficiency in the individual. On the other hand, the Crandall items were developed explicitly to omit that part of lack of belief in control attributable to fatalism. Instead, the scale was developed to deal exclusively with control in intellectual-achievement situations. The source of external control in the situations described in the items is some adult, not fate or "somebody else." The Coleman items seem to tap some generalized fatalism with respect to one's life chances.

The Crandall items form two subscales. The I+ scale consists of those items which refer to control over one's successes; the I- scale consists of items which refer to control over failure. The subscales have not been found to be highly related, although the relationship becomes greater with age of the subjects. Our data corroborate this finding. The product-moment correlation for pre-test I scores is $-.28$. The scales have shown to be highly reliable, by several methods. There is no reliability data on the Coleman items.

The I scores have been shown to be moderately related to IQ and Class, as have the Coleman items. They have similarly been related to achievement, although the data are ambiguous because the relation-

ships are specified by the age and sex of respondents. (For example, one of the studies shows that the scores predict academic achievement for younger girls and high school age boys, but not young boys and high school age girls.) The developers claim the instrument to be most effective as a predictor of report-card grades. The Coleman items have been shown to be important for predicting educational achievement among minority groups in particular. (There is no mention of race in the I score studies.)

On face value both scales do what they purport and clearly obtain information concerning the respondents' sense of control over success and failure. The same background variables differentiate the respondents as to degree of control expressed. Both scales have shown to be predictors of achievement, though of different sorts. How well are they interrelated, or, to what extent are they concerned with different types of control?

The answer is quickly evident -- there is not much relationship. The correlation for pre-test I+ and Coleman scale scores is .11; for I- and Coleman scales it is .00. Table B-1 elucidates the lack of relationship. Intercorrelations are presented for the six Coleman items separately and the I scores. Several trends are notable. First, the Coleman items themselves are at best only moderately related to one another. One cluster does appear among items 36, 37, 39, 41. Items 38 and 40 are each independent of all other items. Secondly, the I scores are not much related to the Coleman items, except to 39.

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TABLE B-1. Control Item Intercorrelation Matrix

	<u>COLEMAN</u>						<u>I Scores</u>	
	36	37	38	39	40	41	I+	I-
36	--	24	03	31	16	04	-06	-03
37		--	17	29	10	28	02	20
38			--	-02	08	04	11	06
39				--	09	30	20	-36
40					--	-01	00	03
41						--	16	-10
I+							--	-28
I-								--

APPENDIX C

Appendix C: Test Effects

Premeasures may affect the final results in that they arouse subject's interest in the topic at hand or provide experience with the relevant task. One procedure for reducing interest is to include non-relevant items randomly assorted among relevant items on the pre-test. This was not done in the present study. There is, however, one rough guide for gauging the amount of premeasure effect which did occur.

At Schools A and C sets of experimental and control groups received the posttest only. Presuming that the premeasure scores for these to have been comparable to the other groups within each school, then we can examine the posttest responses for signs of premeasure effects.* If an item shows much greater rate of correct response at the school with the premeasure, then we are led to suspect that some measurement effect has occurred. Fortunately, these effects do not appear to have influenced the results greatly in our study.

In Table C-1 the percentage who respond knowledgeably to posttest career items are presented. For only one item, 6, does there appear to have been a pre-test effect across both schools and treatment groups. For School C alone, there appears also to have been greater likelihood to respond correctly for the pre-test groups on items 5, 10, and 11.

The legislature items appear even less affected by premeasure experience. For none of the responses to the seven items composing the scale is there a clear premeasure effect across both schools and treatment groups. (See Table C-2.) Again, on several items (21, 25, 32) there are indications of some effect at School C.

* Again, we should remind the reader that subjects were not randomized into groups; hence the assumption is not easily made.

TABLE C-1. Per Cent Who Respond Knowledgeably To Post-Test Career Questions

ITEM	SCHOOL A				SCHOOL C			
	Ex		Con		Ex		Con	
	^a		^b					
	Pre N=20	Pre N=19	Pre N=18	Pre N=20	Pre N=19	Pre N=36	Pre N=30	Pre N=28
3.	75	74	61	75	42	67	47	68
5.	45	53	61	50	47	22	50	21
6.	80	68	61	35	74	33	57	46
8.	80	63	50	70	90	83	100	82
9.	55	79	56	85	69	78	87	86
10.	90	90	89	85	100	86	93	96
11.	10	0	28	10	74	22	67	36
12.	10	0	17	0	58	8	43	18
13.	75	79	67	75	95	67	83	93
15.	85	95	94	85	90	97	77	89
16.	25	32	39	30	42	39	37	36
17.	65	63	56	60	68	69	77	50

a Pre-test administered

b No pre-test

TABLE C-2. Per Cent Who Respond Knowledgeably To Post-Test Legislature Questions

ITEM	SCHOOL A				SCHOOL C			
	Ex		Con		Ex		Con	
	^a							
	Pre N=20	^b Pre N=18	Pre 18	^b Pre 20	Pre N=19	^b Pre N=30	Pre 30	^b Pre 28
21.	10	37	22	20	53	19	80	32
25.	75	74	61	70	90	83	97	61
27.	60	74	83	75	53	89	53	86
29.	10	32	28	10	68	31	50	43
30.	95	95	83	95	74	82	77	79
31.	95	90	89	70	84	89	80	79
32.	20	16	6	60	26	11	53	21

a Pre-test administered

b No pre-test

Finally, with regard to the items tapping sense of control, data in Table C-3 show that there is little indication of premeasure influence. Effect is less expected in items of this sort, self-report information, in contrast to some of the very specific knowledge items.

In general, the premeasure effects which may have occurred do not appear frequently enough to account for the greater learning at School C. Eliminating the questionable items, the results follow the same trend discussed in the main text; the experimental and control groups at School C have greater posttest knowledge than those at School A. Within the schools there is no difference between those exposed to the games and those given the conventional classroom techniques.

Parenthetically, it is particularly regrettable that posttest-only groups could not be obtained for School B. If so, the data would have assisted in deciding to what extent the successful learning in the control group at B may have been the result of premeasure effect.

Finally, the lack of variation in results between comparable pre-test and posttest-only groups further supports our contention that teacher effectiveness is not the most adequate explanation for cross-school differences in learning. The teacher of the posttest-only group at School A was as of limited success as the other teacher at School A. Similarly, the students at School C in the posttest-only groups were as knowledgeable (eliminating test-effect items) as the pre-test students. The likelihood that we had two less effective teachers at School A or two very effective teachers at School C does not appear great, given the trends in the data.

TABLE C-3. Per Cent Who Respond With Sense of Control On Post-Test

ITEM	SCHOOL A				SCHOOL C			
	Ex		Con		Ex		Con	
	^a Pre	^b Pre	Pre	Pre	Pre	Pre	Pre	Pre
1.	55	47	45	40	68	45	80	64
34.	80	62	78	60	74	47	80	79
36.	15	16	39	20	26	36	43	54
37.	75	59	83	55	84	67	83	71
38.	55	69	61	60	47	56	60	54
39.	20	21	44	30	37	17	47	43
40.	45	26	61	55	68	28	80	57
41.	50	63	78	30	68	42	71	68

a Pre-test administered

b No pre-test